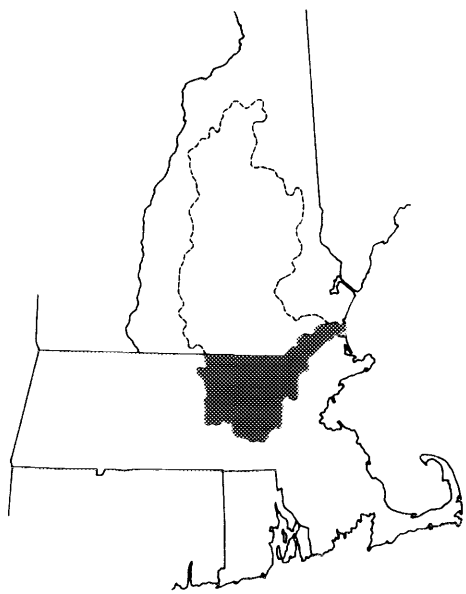
MERRIMACK WASTEWATER MANAGEMENT

key to a clean river

APPENDIX V

INSTITUTIONAL ARRANGEMENTS



NORTHEASTERN UNITED STATES WATER SUPPLY STUDY NOVEMBER 1974

MERRIMACK WASTEWATER MANAGEMENT
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MERRIMACK WASTEWATER MANAGEMENT

(KEY TO A CLEAN RIVER)

APPENDIX V

INSTITUTIONAL ARRANGEMENTS

November 1974

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INTRODUCTION

The overall goal of the Merrimack Wastewater Management Study was to develop and evaluate alternative wastewater management strategies that achieve the long range goals of the Federal Water Pollution Control Act Amendments of 1972. These two goals are:

1. "...the discharge of pollutants into the navigable waters be eliminated by 1985"; and

2. "...wherever attainable, an interim goal of water quality which provides for the protection and propogation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983."

The institutional changes that may be necessary to accommodate the wastewater alternatives developed in this study have been the subject of much controversy. Governmental officials and agency representatives have agonized through many hours of deliberations. This appendix should prove to be an extension of that debate.

The basis of controversy can be found in the fact that the new law makes many exact and far-reaching demands upon existing federal, state and local institutions. Present management structures and policies may well have to be modified to comply with the intent of the new law. Stringent monitoring and enforcement procedures for point sources of pollution as well as the implementation and enforcement of strong land use management practices necessary to control or prevent non-point sources of pollution will probably exceed the capabilities of existing institutions. Requirements to develop and administer equitable systems of user charges and user fees will also bear heavily on the resources of local municipalities. Study findings indicate that there is no clear consensus of opinion regarding future institutional arrangements. Most participants to this study agree that institutional changes are in order. The issue at hand is the type and extent of change.

Definitive answers to many of the questions that will be raised in the following pages is beyond the scope of this appendix. Indeed the resolution of the institutional issue is beyond the scope of the Merrimack Wastewater Management Study itself. What is presented, however, should be considered as an earnest attempt to illuminate some very critical issues and some very real problems in the arena of water quality restoration and preservation.

Whether the modifications and changes suggested in this appendix become realities will depend largely upon political factors - on the support of the public and of the officials at all levels of federal, state and local governments. Even if the political atmosphere were favorable to the ideas put forth in this document, implementation of its proposals is impeded by a number of factors both legal and institutional that have historically received too little attention from planners and engineers. Many legal issues directly involved with institutional/management changes; i. e. creation, deletion or modification of powers and authorities presently invested with existing agencies and local governments, have not even begun to be thoroughly explored in this report. There is no question that substantial commitments of manpower and resources will have to be pledged and brought to bear to effect any institutional change.

Although this document may well be applicable to the entire Merrimack River Basin, it was principally developed by ABT Associates, Inc. as part of the wastewater management study being conducted by the New England Division of the Corps of Engineers, in cooperation with Region I of the United States Environmental Protection Agency and the Commonwealth of Massachusetts for the twenty-four communities within the jurisdiction of the Merrimack Valley Planning Commission and the Northern Middlesex Area Commission.

The principal ABT Associates staff who participated in the Merrimack River Wastewater Management Study are John Willson, the Project Manager, Barbara Gerson and Francis Cummings. Edward Selig and John O'Brien contributed greatly to the study as outside consultants.

The document also owes much to the thoughtful contributions of the members of the Merrimack Wastewater Management Study Technical Subcommittee who participated actively in its formal review.

A. THE EXISTING INSTITUTIONAL FRAMEWORK

1. Overview

A convenient framework for describing and analyzing the existing set of institutional and financial arrangements governing water quality management in the Merrimack basin is a simple matrix which arrays functional responsibilities against the levels of government at which they are carried on. (See Figure 1).

The basic water quality management functions can be characterized as (1) planning, (2) finance, (3) construction, (4) operations and maintenance, (5) monitoring, and (6) enforcement. Planning here includes waste treatment facilities planning as well as a number of possible levels of greater geographic and/or functional inclusiveness. Finance in this framework means strictly the financing of treatment works. Monitoring covers quality control over the operational performance of treatment works. The more general role of standards setting for a particular function is included as a part of performing the function itself.

The levels of government at which these functions are currently performed are enumerated simply as (1) federal, including federal Regional Offices, (2) inter-state regional, (3) state, (4) sub-state regional, and (5) local.

The resulting matrix provides a quick, shorthand description of which agencies perform what functions in the Merrimack study area, as well as a basis for judging which of these agencies are relatively the more important. Significantly, it underscores the dominant role played by individual municipal governments in the area of water quality management. The existing institutional/financial structure is an extremely decentralized one, with local governments essentially performing all six functions within their own separate jurisdictions. There are few intermunicipal on other area-wide institutions in existence to capitalize on achievable economies of scale in financing, building and operating waste treatment facilities. Regional planning agencies are limited solely to planning, and that only in an advisory capacity.

Examination of individual columns in the matrix reveals a second important feature of the existing institutional structure, the extent to which responsibility for certain key functions such as finance, monitoring and enforcement are formally divided among levels of government. For instance, in Massachusetts, the construction of public waste treatment works is financed by a combination of funds from federal (EPA), State and local sources. Again, the issuance of NPDES discharge permits is preceded by state-federal interaction. A similar division of authority is presented between state and local governments; the Massachusetts Department of Public Health retains the power to override a local board of health that has failed to adequately enforce the provisions of the State Sanitary Code relating to protection of the public water supply.

FUNCTIONS

Figure 1

LEVELS OF GOVERNMENT	PLANNING	FINANCE	CONSTRUCTION	OPERATIONS & MAINTENANCE	MONITORING	ENFORCEMENT
Federal	EPA	EPA		EPA	EPA	EPA
Interstate Regional	NERBC					
State	DWPC (Mass.)	DWPC	DWPC	DWPC	DWPC DPH	DWPC DPH
Substate Regional	RPA's					
Local	Municipal Gov'ts.	Municipal Gov'ts.	Municipal Gov'ts.	Municipal Gov'ts.	Municipal Gov'ts.	Municipal Gov'ts.

KEY:
- EPA - Environmental Protection Agency
- NERBC - New England River Basin Commission
- DWPC - Mass. Division of Water Pollution Control
- DPH - Mass. Department of Public Health
- RPA - Regional Planning Agency
- Municipal Gov'ts. - Merrimack Municipal Governments

The planning column itself reveals an especially important characteristic of the new dispensation for water quality management planning under the provisions of the 1972 Federal Water Pollution Control Act Amendments. That law establishes a hierarchy of planning processes which ranges from local facilities planning (Section 201) up through areawide planning (Section 208) to state-level basin planning (Section 303(e) and including inter-state regional planning (Section 209). At the pinnacle stands EPA, which does no planning itself but establishes the standards by which all lower levels must structure their planning processes and model their plan outputs.

Finally, an examination of the individual row elements in the matrix shows unmistakably the dominance of EPA within the federal government and DWPC within the Massachusetts government, as the agencies having primary water quality management-related responsibilities.

The sections of this draft report which follow take their basic organization from the matrix presented here. Section 2 provides detailed functional and organizational descriptions of six key water quality-related agencies in the Merrimack River basin--EPA, the Mass. DWPC, the Mass. DPH, the RPAs, water pollution abatement districts and local governments. Section 3 describes two important policy level agencies affecting water quality management--the Resource Management Policy Council and the Office of State Planning and Management. Section 4 briefly describes the functions and organization structures of related, but less directly involved, agencies which touch upon water quality management--the Corps of Engineers, the New England River Basins Commission, the Massachusetts Division of Water Resources, and the Massachusetts Department of Community Affairs. Section 5 is devoted to brief discussions of important related pieces of federal and state legislation, existing and pending. Existing laws discussed include: the Massachusetts regional planning statute; Massachusetts laws authorizing creation of industrial pollution control authorities and special tax treatment of industrial pollution control expenditures; the Flood Disaster Protection Act of 1973; the Massachusetts laws governing alteration of wetlands, development along inland rivers and preparation of environmental impact statements; and the Massachusetts private right-of-action statute. The discussion of pending legislation extends to national land use planning, proposed reorganization bills in Massachusetts for the Department of Environmental Affairs as well as for regional planning agencies and county governments.

2. Key Water Quality Management Agencies

a. United States Environmental Protection Agency

The United States Environmental Protection Agency (EPA) is the federal agency having principal responsibility in the field of water quality management. It is primarily a regulatory agency, that is, it establishes and enforces standards for the performance of the

various water quality management functions. It is also a significant source of financial and technical assistance to state and local governments in support of their water pollution control activities. The EPA's water quality management authority is set forth in the Federal Water Pollution Control Act Amendments of 1972 (PL92-500), and the discussion in the following sections is organized in terms of the EPA's specific functional responsibilities under that Act. (Unless otherwise indicated, all citations are to sections of PL92-500.)

The functions covered are planning, finance, operations and maintenance, monitoring and enforcement. Since the permit program prescribed by PL92-500, the National Pollutant Discharge Elimination System (NPDES), is not properly categorized in terms of any such neat functional breakout but, instead, crosses all these lines, it will be discussed separately at the outset.

NPDES

The permit system, which covers all point source discharges to navigable waters, is intended to provide the means for translating basin, area wide and municipal-level plans into sets of legally-enforceable requirements for action on the part of individual municipal and industrial polluters which will bring them into compliance with national water quality objectives. The requirements are a) by July 1, 1977, "best practicable currently available" control technologies for industry, and secondary treatment for publicly-owned facilities and b) by July 1, 1983, "best available economically achievable for industry" and "best practicable" for the public treatment facilities. The final, "ultimate" goal is achievement, by July 1, 1985, of "zero discharge" of pollutants. The permit will prescribe the water quality standard and specific effluent limitations which the discharger must meet to achieve these goals, as well as the sequence of steps, termed the "compliance schedule", that he must take in order to do so. Thus the NPDES permit at once establishes the content of micro-level planning, the basis for monitoring future performance, and the means for legal enforcement.

Under the NPDES, the EPA sets technology-based national effluent limitations for municipal treatment plants as well as the various types and categories of industries. The actual administration of NPDES can rest with either the EPA or the individual state. The EPA can delegate the "permitting" power to a state if it demonstrates the statutory and administrative capacity to meet EPA-prescribed management criteria. Where a state manages its own permit program, the EPA retains a veto over the issuance of individual permits and is responsible for monitoring overall state performance. Where a state either fails (or chooses not) to meet EPA standards for administering a permit program, the NPDES will be carried out by the appropriate EPA Regional Office. However, before the EPA will issue any permit, that state must certify that the proposed permit will fully comply with all applicable standards and effluent limitations.

Although a 1973 legislative enactment in Massachusetts empowered the water pollution control agency (DWPC) to implement a permit program similar to the NPDES, the state has not sought, nor has EPA announced whether the state program qualifies for, state administration of the NPDES. It should be noted that the permit program in Massachusetts is potentially broader than that contained in PL92-500 inasmuch as it comprehends discharges to groundwater while the NPDES covers only point source discharges to surface waters. The NPDES is now being administered in Massachusetts jointly by the EPA and the DWPC.

Planning

PL92-500 greatly expands the federal emphasis on water quality management planning, particularly coordination among water pollution control activities at the different levels of government. Specifically, it calls for the integration of the NPDES permit program into a three-tiered structure of planning operations which includes:

- municipal facilities planning, at the local government level (section 201);
- areawide wastewater management planning, by regional agencies in complex urban-industrial areas (section 208);
- basin planning, at the state level (section 303(e).

To a large extent, PL92-500 prescribes similar planning objectives for all three levels, the principal distinctions among them being geographic scope and the level of planning detail required. Coordination is to be achieved by requiring local facilities plans to be incorporated as elements of the larger areawide plan, which in turn must be incorporated in, and consistent with, the state level basin plan. The individual NPDES permit is the common link between levels in the planning heirarchy. It is the essential element in detailed local planning and the means by which monitoring and enforcement will lead to the achievement of larger area, state, and national water quality goals.

The EPA itself does not do water quality management planning, but still plays a key role in the planning process through its powers to:

- designate the state planning agency and, in the case of section 208, establish criteria for the designation of areawide planning and management agencies;
- develop and publish guidelines regulating the content and conduct of local, areawide, and state planning;
- approve state requests for planning grants; and

- approve basin-level plans submitted to it by the states.

Areawide planning is the only component of this planning process currently not operational in Massachusetts. In Massachusetts a policy decision has been made to give primary consideration to Regional Planning Agencies for 208 planning responsibilities. Public meetings are currently being held around the state to explain the process of 208 area and planning agency designations and to accept additional agency nominations.

The law also provides for basin-wide studies of water and related land resources, so-called Level B or Section 209 planning. The New England River Basins Commission has developed a proposal to conduct a 209 planning effort in the combined Merrimack-Nashua basin, the study itself if approved is scheduled to be completed by October, 1977.

Finance

The EPA is the principal source of grant funds for the construction of public wastewater treatment facilities. It is authorized to make federal grants totaling 75% of the costs of constructing eligible treatment works to any state, municipality, intermunicipal or interstate agency (sections 201(g)(1), 202 and 206). The EPA determines eligibility in accordance with a number of specific criteria spelled out in the act (sections 202, 204).

The 1972 FWPCA amendments also established a public corporation, the Environmental Financing Authority, to purchase municipal treatment plant construction bonds that could not otherwise be sold in the open market. The EPA plays a role through the requirements that it underwrite the municipal obligations and certify both that the project is eligible for federal grant funds and that the municipality was unable to obtain credit elsewhere on reasonable terms.

The Act requires that each industrial user of a federally-financed treatment plant repay a portion of the federal grant based on its proportionate use of plant capacity. However, the EPA does not recover all of the industrial portion of its construction subsidy. The public agency operating the facility may retain up to 50% of the recovered charges for use in future renovation or expansion projects (section 204(b)(3).

The EPA also provides funds for a variety of other water quality management functions, including:

- municipal facilities, areawide and basin-level planning (section 201, 208, 303 (e);
- state pollution control programs (section 106);
- plant operator training programs (section 104(g), 109, 111);

- pollution control research and demonstration programs (section 105);

- sewer system evaluation studies (section 201(g)(4).

Monitoring

The EPA is not authorized to own or operate waste treatment facilities, but it does play an important role, directly and indirectly, in monitoring their operations. The EPA establishes O&M criteria for public treatment works and conditions federal construction grants (section 204(a)(4), approval of areawide waste management programs (section 208(c)(2)(B) and (C), and state administration of the NPDES (section 402(b)(1)(A) upon their achievement. The agency has authority to conduct an annual survey to determine the quality of operations and maintenance performance in plants which have received federal construction assistance (section 210). Furthermore, the EPA requires that the states establish and carry out satisfactory monitoring practices as a condition for receiving state program grants (section 106(e)(1) and administering the NPDES permit system (section 402(b)(2).

Enforcement

States have the primary enforcement role under PL92-500. EPA's enforcement powers come into play only when the state proves either unable or unwilling to enforce the law.

The state's primary enforcement mechanism is the NPDES permit program. If a state fails to show that it will be able to administer the NPDES (section 402(a)(5) and (b)), or if it administers it inadequately (section 402(c)(3)) EPA may refuse to give, or withdraw, permission to run the program. If a state with an otherwise well-run program fails to enforce its permits, EPA can assume enforcement responsibility without revoking the entire state program (section 309(a)).

The state must provide EPA with a copy of each permit it issues. If EPA determines that the state has incorrectly issued a permit, it may veto it (section 402(a)(5) and (d)(2)). EPA requires the states to prepare a list of permit violators quarterly. Although EPA has independent powers to issue compliance orders or bring suit against the discharge (section 309(a)) it will instead rely on a process of notification. If the violator does not comply voluntarily, and if the state fails to take enforcement action within 30 days, then EPA must intervene either by compliance order or by suit. EPA may bring civil actions either to enjoin pollution (section 309(b)) or to exact penalties up to $10,000 a day (section 309(d)). Where there is willful or negligent violation of a permit or any other provision of the act, then EPA may bring criminal suit, with penalties for a first offense ranging from $2,500 to $25,000 for each day of violation or up to one year of imprisonment (section 309(c)(1)).

The Environmental Protection Agency is a complex organization. Those components of the EPA directly involved in water quality management functions fall under two Assistant Administrators, the first for Water and Hazardous Materials, the second for Enforcement and General Counsel. Under the Assistant Administrator for Water and Hazardous Materials, the two key units are the Office of Water Program Operations, which directs the federal construction grant programs, and the Office of Water Planning and Standards, which oversees the area-wide and state planning programs. Under the Deputy Administrator for Enforcement and General Counsel, the Office for Water Enforcement reviews evidence and prepares enforcement actions against permit violators. Within the General Counsel's office itself there is the Office of Permit Programs which is responsible for implementing the NPDES and for reviewing permit applications.

At the EPA Boston Regional Office level, the key units are: a) the Water Branch of the Water and Hazardous Materials Division, which extends technical assistance in water quality planning and management; the Enforcement Division, particularly, b) the Permits Branch which reviews discharge permit applications, c) the Enforcement Branch which initiates legal actions against permit violators; and d) the Grants Administration Branch of the Management Division, which handles the construction assistance program.

b. Massachusetts Division of Water Pollution Control

The Division of Water Pollution Control (DWPC), which sits under the Water Resources Commission within the Massachusetts Department of Natural Resources, is the Massachusetts State agency exercising primary operational responsibilities in the area of water quality management. Its controlling statute is the Massachusetts Clean Waters Act (Massachusetts General Laws, c. 21, §§21-58). In 1973 the Legislature revised the Clean Waters Act (Acts of 1973, cs. 546, 739, 744 and 1074) to bring the DWPC's mandate and authority into conformance with the requirements of the Federal Water Pollution Control Act Amendments of 1972.

DWPC's responsibilities in water quality management include important functions in the areas of planning, finance, monitoring and enforcement: (all citations below refer to M.G.L. c. 21),

Planning

- The DWPC establishes water quality standards and associated effluent limitations for all interstate waters [27(10)].
- It must review and approve engineering reports and final plans and specifications for all proposed public treatment facilities [27(13)].

- It must approve all municipal applications for federal and state construction grant funds, based on a state facilities priority list updated annually [30A, 33].

- DWPC is the agency designated to conduct basin-level planning as required under section 303(e) of the Federal Water Pollution Control Act.

Finance

- The Division makes construction grants for qualifying public treatment facilities to cover 15% of costs, bringing the combined federal-state share to 90% [30A, 33].

- DWPC is also authorized to make grants to municipalities for comprehensive planning of waste-water treatment facilities, preparation of final plans and specifications for such facilities, and pre-financing of federal grants [30A, 31].

Monitoring

- The Division monitors the operations and maintenance of public treatment plants through a variety of means, including plant inspections (Section 40), required submission of monthly operating records (Section 27(7), 43(7)), and issuance of O&M regulations, Section 27(9).

- DWPC funds training of public waste treatment plant operators (Section 27(11)), and requires operator certification by the state Board of Certification of Operators of Wastewater Treatment Facilities.

- DWPC also monitors the operations of industrial treatment facilities through formal inspections as well as frequent technical discussions with company representatives concerning proposed abatement measures.

Enforcement

- The principal tool for enforcing water quality standards and effluent limitations is the discharge permit under the NPDES. Until the Division's permit program receives final EPA approval, DWPC and EPA Region I issue joint permits to public and industrial dischargers.

- Under the joint permit program, DWPC can deny permits if it appears that the discharge is unlikely to conform with the relevant water quality standard and effluent limitations (section 43(5)). The Division also has the power to suspend, revoke or modify any outstanding permit (section 43(10)). It can issue cease and desist orders to permit violators (section 44(1) and take criminal and/or civil action against them (section 42).

- DWPC can order municipalities or groups of municipalities to form pollution abatement districts and prepare engineering reports and plans for a treatment facility. If a district is not created voluntarily, the Division can mandate its formation and appoint its commissioners. If either a voluntary or mandatory district does not undertake to prepare engineering reports and plans, DWPC may have such plans and reports prepared at the muncipalities' expense (section 33B).

- The Division may also order a municipality to establish and enforce an adequate sewer ordinance regulating wastes that flow into a public treatment plant (section 43 (9)). Where there is not an adequate sewer ordinance, DWPC can prohibit all further sewer connections until such an ordinance is established and enforced (section 44(2)).

DWPC is organized internally into seven sections: Water Quality, Construction Grants, Industrial Wastes, Oil Pollution, Operation and Maintenance, Enforcement, and Research and Training.

The Water Quality section is responsible for surveying, analyzing and reporting on the condition of all natural waters in the Commonwealth, and performs the required 303(e) basin-level planning function.

The Construction Grants section reviews engineering reports, final plans and specifications, and makes grants to municipalities for developing water pollution abatement plans and for financing up to 15% of construction costs.

Industrial Wastes staff review proposed designs for private treatment facilities and work closely with companies in formulating their pollution abatement plans.

The Oil Pollution section investigates and supervises the cleaning up of oil spills in Massachusetts waters, and licenses marine oil terminals and waste oil collectors.

Operation and Maintenance personnal supervise public water treatment facilities through plant inspections and review of monthly operating records to assure that plan efficiency does not suffer as a result of inadequate funds, poor operation or general neglect.

The Enforcement section is responsible for administering the joint EPA-DWPC permit program for municipal and industrial discharges. It develops implementation plans for individual permits, monitors their implementation, and takes enforcement actions (either voluntary or through legal process) as required.

The Training and Research section funds studies by consulting engineering firms and research institutions to develop more efficient wastewater treatment systems. Its training activities mainly involve training of waste treatment facility operators.

The Division also maintains three Regional Offices, located in Boston, Pembroke and Amherst. The Merrimack Wastewater Management Study area falls within the responsibility of the Boston Regional Office. As of the end of FY 1973 the Division had a technical staff of 37 persons and an additional 19 administrative personnel.

c. Massachusetts Department of Public Health

Until 1966 with the creation of DWPC, the Department of Public Health was the principal state agency with water pollution control responsibilities. Since that time DPH has been concerned with water pollution only as it presents public health problems. Such problems may arise through the effects of pollution on the quality of the public water supply, the amount of bacteria present in public bathing areas and shellfish beds, and the creation of public nuisances.

To protect public water supply systems, DPH must approve plans for all water-oriented waste treatment facilities and periodically monitor their operations as they affect water quality. As a part of this plan approval process, DPH conducts the required plant siting hearings jointly with DWPC. The Department must also approve all municipal land purchases or takings for sewage treatment facilities, as well as the proposed overall sewerage system.

Especially important to land-oriented disposal schemes, DPH under Article XI of the State Sanitary Code is responsible for regulating all methods of sub-surface waste disposal. All systems with a capacity for discharging more than 2,000 gallons per day of liquid wastes into the ground must receive prior approval in writing from the Department. The basic rationale for this authority is to protect groundwater supplies and avoid public nuisances, but when advanced land-oriented disposal systems are being considered it will doubtless extend to a concern for introduction of toxic substances into the food-chain. After DPH approval

for sub-surface disposal, departmental officials are also responsible for periodic surveillance and monitoring.

In terms of general enforcement powers DPH can require municipalities to provide and maintain adequate sewage treatment works. When a local Board of Health fails to adequately enforce the Sanitary Code, the Department can exercise override powers and enforce the code for it. Violations of the Code are punishable by fines up to $500 per offense.

The relevant organizational components of DPH for water quality management are within the Division of Environmental Health, namely the Bureau of Water Supply and Water Quality and the Bureau of Community Sanitation. The division of labor between the two bureaus is essentially between water-oriented and land-oriented disposal.

d. Regional Planning Agencies

Section 208 of the amended FWPCA is an explicit recognition of the need for a regional perspective on the problems of water quality planning and management in complex urban-industrial areas. Under the requirements of section 208, an area-wide planning process must exist which can:

- identify the area's needs for treatment wastes over the next 20 years, as well as the needed institutions to construct and operate them and the arrangements for financing them;
- devise cost-effective area-wide pollution control strategies, with particular sensitivity to land use and other environmental, economic and social impacts;
- develop a regulatory program to implement industrial pre-treatment requirements; and
- identify processes for controlling disposal of residual wastes, non-point source pollution, and the location of all major facilities which may result in wastewater discharges.

As noted earlier (see section a.), the state of Massachusetts has already made a major policy decision to give existing RPAs "primary consideration" for designation as 208 planning agencies. In Massachusetts RPAs are the only sub-state, areawide planning bodies currently in existence and operational.

The RPAs have extensive experience in comprehensive area-wide planning in a number of substantive areas directly related to water quality management, e.g., sewer and water, land use, open space and

recreation. They gain an additional degree of regional perspective through their role as area-wide clearinghouses as part of the OMB Project Notification and Review System (A-95), under which they review and comment on grant proposals to over 100 federally-funded physical development and social programs. Finally, RPAs, to the extent they have participated in on-going water quality management studies such as those for the Merrimack and Nashua basins, have already begun to acquire the kind of planning exposure envisioned under 208.

RPAs are voluntary associations of cities and towns, formed in Massachusetts either under the provisions of M.G.L., c. 40B or by special enactment. RPAs receive their funding support from four major sources: assessments upon individual member communities, HUD 701 matching grants, contracts with federal and state agencies for substantive planning, and limited general state assistance.

The Merrimack River Basin study area encompasses twenty-four (24) Massachusetts municipalities, organized under two regional planning agencies: the Merrimack Valley Planning Commission and the Northern Middlesex Area Commission.

Merrimack Valley Planning Commission (MVPC)

Members (15): Amesbury, Andover, Boxford, Georgetown, Groveland, Haverhill, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, West Newbury.

The MVPC covers a diverse area, containing three principal sub-regions, centered around Lawrence, Haverhill and Newburyport.

Representation: Follows the Ch. 40B model where each member community's planning board selects one of its members to represent it on the Board. Alternates for each member community are designated locally by Councils or Boards of Selectmen.

Staff Size and Budget: Six (6) full-time professionals, one (1) part-time professional, two (2) full-time clerical. Current year;s budget approximately $135,000, funded through (a) 10¢ per capita local assessment; (b) HUD 701 matching funds; (c) Army Corps of Engineers contract for Merrimack Wastewater Management Study; (d) two contracts with the Massachusetts Department of Public Works, one for transportation planning and the other for solid waste management planning; and (e) state aid.

Northern Middlesex Area Commission

Members (9): Billerica, Chelmsford, Dracut, Dunstable, Lowell Pepperell, Tewksbury, Tyngsboro, Westford.

More a metropolitan area than MVPC, principally Lowell and its satellite communities.

Representation: Different from Ch. 40B model; based on a special enactment (Acts of 1972, Ch. 357). One councilman from Lowell, one selectman from each of the other eight (8) towns, and one (1) member of the planning board of each member city and town.

Staff Size and Budget: Five (5) full-time professionals, two (2) full-time clerical, one (1) part-time clerical. Current year budget is approximately $192,000, funded through (a) 26.5¢ per capita local assessment; (b) HUD 701 funds totalling $40,000; (c) Army Corps of Engineers contract for Merrimack Wastewater Management study; (d) Massachusetts Department of Public Works Contract for transportation planning; and (e) state aid.

e. Greater Lawrence Sanitary District

While the basic powers to plan, finance, construct, operate and maintain wastewater treatment facilities are decentralized to the level of city and town government, Massachusetts law does provide for an instrumentability for intermunicipal cooperation in performing these functions: the water pollution abatement district. Upon proposal by the DWPC, individual communities may come together voluntarily to form such a district to provide integrated wastewater management services on an areawide scale (Mass. General Laws, Ch. 21, section 28(a)). Under the recently enacted "mandatory districting" provisions (Ch. 1074, Acts of 1973), DWPC can now order communities to form an abatement district where they fail to act voluntarily.

Districts for the most part are the creatures of their constituent members, having little political or financial independence from local governments. For voluntary districts the governing commission must consist entirely of representatives appointed by the member municipalities. However, should DWPC mandate the formation of a district, then it can appoint the commissioners itself. The district's local share of construction costs can only be financed from municipal appropriations or by general obligation funds backed by the credit of the individual municipality just as if the town were building its own facility. Likewise, operating costs are borne by the member municipalities. The district commission establishes the cost apportionment formulae; the towns pay their apportioned shares either through property tax assessments or user charges.

No mandatory districts have been established under Chapter 28 provisions. The only voluntary abatement district in the Merrimack basin is the Greater Lawrence Sanitary District, formed by special enactment (Ch. 750 of the Acts of 1968, as amended by Acts of 1970, Ch. 320) to provide integrated wastewater management for Lawrence, Methuen, Andover and North Andover. The GLSD has authority to develop comprehensive pollution abatement plans, to receive federal and state planning and construction grants; to issue long term debt to finance its capital

outlay programs; to acquire land and, under DWPC supervision, to construct, operate and maintain abatement facilities. With the approval of DWPC it may administer the permit program that regulates discharges to its works. GLSD representatives are authorized to enter public and private property to determine compliance with its effluent regulations, and the District may enforce its regulations through the courts or otherwise. Injunctive relief is a remedy made specifically available in the GLSD enabling statute.

The GLSD has completed its planning and is currently at the ground breaking stage for the North Andover secondary treatment plant called for under the EPA-State Implementation Plan. At this point GLSD has no administrative staff separate from the member towns. Its board is made up of eight commissioners: three (3) from Lawrence; two (2) from Methuen; and one (1) each from Andover and North Andover. Future representation increases are geared to population growth in the member towns. Under its current statute there is no authorization for either dissolving the GLSD, enlarging its boundaries, or incorporating it within a larger district. Any such action would require new legislation.

f. Municipal Governments

Finance

The basic municipal financing mechanism is the property tax. Individual tax assessments are set to cover added sewerage and sewage treatment facility costs. Municipalities may contract with other governmental units for the disposal of sewage (Ch. 40, Section 4), may purchase or take land within their limits for sewage abatement purposes (Ch. 40, Section 14, and Ch. 83, Sections 1 and 6), and may transfer excess municipal land from one agency to another for use in a specific municipal purpose such as pollution control (Ch. 40, Section 15A). With the approval of the DWPC, municipalities and other governmental units may apply for, accept and receive state and federal funding for the planning (Ch. 21, Section 30A and 31) and construction (Ch. 21, Sections 30A and 33) of pollution abatement facilities. For qualifying publicly-owned facilities, combined state-federal funding can total 90% of the treatment facility construction cost.

In instances where it may be necessary for the DWPC to resort to the "mandatory district" statute and have engineering reports and/or plans prepared for a governmental unit, the DWPC may determine how the costs of such reports and/or plans will be borne by the government unit(s) involved. More importantly, the "mandatory district" statute provides a means by which municipalities may be forced to pay for the costs of construction and operations and maintenance: since Ch. 21 provides that these district costs are to be paid by a member municipality either by assessment against the tax base or directly from the municipality's share of annual state-aid payments, it is possible that, if the DWPC-

appointed commissioners of a mandated district are willing to proceed with a pollution abatement plan, such a project could be built for and paid for by a community otherwise unwilling to undertake such a project.

Construction

Consistent with the broad powers historically given to municipalites to plan their sanitation systems, local government has the primary authority to construct such systems. Subject to both DPH and DWPC approval, municipalities may construct sewers and sewage treatment works, and are authorized to acquire or take interests in land within the confines of their borders for this purpose (Ch. 82, Sections 1 and 6). Municipalities may be ordered to construct sewage treatment facilities by the DWPC (Ch. 21, Section 33D): compliance with the Division's permit program will, in many cases, itself require construction of treatment facilities, notwithstanding any order issued by the Division.

Operation and Maintenance

In keeping with their traditional role in the planning and construction of sewerage systems and sewage treatment works, local governments are empowered to maintain and operate sewer systems (Ch. 82, Section 1) and sewage disposal works (Ch. 83, Section 6). Municipalities are also empowered to regulate the use of their system (Ch. 83, Section 10). Municipal sewage disposal works must be operated in a manner satisfactory both to DPH (Ch. 83, Section 7) and DWPC (Ch. 21, section 27, 43(7)). Regulations governing and maintenance of sewage treatment facilities have been promulgated by DWPC (Ch. 21, Section 27(9)).

Monitoring

To insure the integrity of its treatment process, a municipality may regulate the types and amounts of wastes which may be introduced into its system (Ch. 83, Sectiob 10); such regulations may be required by the DWPC (Ch. 21, Section 43(a)) and the DPH (Ch. 83, Section 7). Municipalities may maintain separate systems for drainage of storm water and sewage wastes discharge to the appropriate drain (Ch. 83, Section 5). Municipal boards of health may require that private drains be put in good condition (Ch. 83, Section 12) and may repair a break in a sewer in a private way if the landowner requests and pays for such repair (Ch. 83, Section 3A).

The DWPC may require municipalities to establish monitoring, sampling, record keeping and reporting procedures and facilities, and to submit to the DWPC data gathered therefrom (Ch. 21, Section 27(7) and 43(7)). In addition to the strong and increasing presence of DWPC in regulating municipal sewage treatment practices, local governments (through their planning agencies, boards of health, and sewer commissions)

are playing a considerable role in setting sewer use practices incident to their land use planning interests. To get a building permit, the Sanitary Code requires that a builder have a sewer connection permit from the local sewer commission (if the planned project is to be served by a sewer system). If it is to be served by a subsurface disposal system, a permit from the local board of health is required if the system is to handle less than 2,000 gallons per day; if it is to handle more than 2,000 gallons per day such a subsurface disposal authorization must come from the DPH.

As a related regulatory power, local conservation commissions under the Hatch-Jones Wetlands Protections Act have the power to control the development of wetlands within their communities. The commissions monitor wetlands areas; set conditions on developers seeking to alter them by filling, dredging or other means; and can issue cease and desist orders on developers who ignore commission requirements.

Enforcement

Municipalities may regulate by permit the digging up of a public way to lay, alter or repair a drain or sewer (Ch. 83, Section 8). Municipalities may enforce sewer use regulations; orders requiring connection to separate stormwater and sewage drains; orders requiring connection of buildings to common sewers; and orders requiring that private drains be put in good condition.

3. Policy Level Planning and Coordination Agencies

a. Resource Management Policy Council

RMPC is a Massachusetts cabinet-level committee made up of the Secretaries of Communities and Development, Administration and Finance, Environmental Affairs, Transportation and Construction, Manpower Affairs and Consumer Affairs. It is located in the Governor's Office and currently operates under an informal inter-agency agreement; an executive order officially establishing the council is now being prepared. Chaired by the Secretary of Communities and Development, RMPC's primary responsibility is to develop an integrated state-level approach to problems of land use planning and control. Under this general mandate, specific inter-agency working groups have already been set up to work on related problems as diverse as air pollution control, common substate regions for the planning and delivery of state services, and uses for excess state property.

RMPC's particular importance to wastewater management stems from its role as the State Policy Committee for the overall water

pollution control program in Massachusetts. Through a State Technical Committee over which its sits, RMPC is responsible for overall policy direction for four regional wastewater management studies currently being conducted around the state (Metropolitan Boston, Merrimack basin, Nashua basin and Southeastern Massachusetts). These studies are designed to provide much of the groundwork for the eventual implementation of the amended FWPCA and the achievement of its 1977, 1983, and 1985 water quality objectives. The State Technical Committee adds to the basic RMPC membership representatives of Region I, EPA and the New England Division of the Army Corps of Engineers, and serves as the primary working group directing the planning efforts. Technical subcommittees of this group in turn sit over each of the four planning studies and include representatives of the lead agencies selected by the state to head up that particular effort, as well as from the specific regional planning agencies involved. This elaborate hierarchy of Policy Committee--Technical Committee-Technical Subcommittees is intended to achieve some central direction of what is necessarily a complicated inter-agency planning task, and to insure that forums exist to resolve inter-agency conflicts at appropriate levels.

b. Office of State Planning and Management

OSPM, located within the Secretariat for Administration and Finance, is the state's principal staff resource for the planning and implementation of special projects which cross agency levels and hence require close inter-agency coordination. Water pollution control by its nature qualifies as such a special problem, and in this coordinating role OSPM serves as the staff arm of the State Policy Committee (RMPC).

A senior OSPM official representing Administration and Finance chairs the State Technical Committee, which oversees all four regional wastewater management studies, and OSPM representatives also sit on the four relevant Technical Subcommittees. Their function is that of policy issue identification and conflict resolution. Their specific job is to surface inter-agency problems where they exist and to get them resolved at the appropriate level, be it technical or policy. OSPM has taken a very active role in insuring that the outputs of the various wastewater studies serve as directly useful inputs to the state 303(e) basin-level planning process. Where conflicts arise OSPM staff take them for resolution to the RMPC.

4. Other Related Agencies

a. U.S. Army Corps of Engineers

The Corps of Engineers began to move away from its traditional concerns with just navigation and flood control in the late 1960's as it instituted its Wastewater Management Program. The Merrimack Waste-

water Management Study in Massachusetts is one of the first round of pilot studies funded by Congress to demonstrate the feasibility of regional wastewater management. As this program proceeded, the realization grew that the principles being employed for studying wastewater management were also pertinent to wider water and land resource problems of urban areas, and in 1974 the Corps embarked on an Urban Studies Program. The basic objective of this program is "to develop water and related resource plans for specified urban areas . . . that not only offer realistic prospects for solving specific urban problems, but, equally important, also have the potential to serve as a catalyst for solving other related problems." Urban problems "related" to wastewater management now include urban flood plain management; municipal industrial water supply; lake, ocean and estuarine restoration and protection; and recreational management and development at civil works projects.

Under its Urban Studies Program the Corps follows a standard planning process divided into four distinct phases: needed identification formulation of alternatives, estimate of socio-economic and environmental impacts, and plan evaluation. The two basic principles which are supposed to guide this planning process are (1) an explicit recognition that the responsibility for comprehensive planning in urban areas belongs to state and local governments and (2) avoidance of duplication of conflict among federal agencies, including the Corps, which participate in urban planning. Also, urban studies are required to provide alternatives which are consistent with the letter and intent of PL92-500 where wastewater management is involved.

Unlike its role in the Merrimack study, where it is the lead agency, the Corps' role in the Nashua River basin is restricted to that of participating as a member of the Program Advisory Committee of the Nashua River Program. However, the Corps is charged with the responsibility for ultimately assuming that the outputs of its Merrimack and Eastern Massachusetts studies are mutually consistent.

b. New England River Basins Commission

NERBC is a federal-state planning organization established under the authority of the Water Resources Planning Act of 1965. Its membership is composed of the six New England states and New York, ten federal agencies, and six other inter-state regional agencies having water pollution and/or flood control responsibilities. Under its enabling statute NERBC has four general functions:

- to coordinate water and related land resource plans throughout the region;
- to prepare and update plans for managing the region's water and related land resources;

- to recommend long-range priorities for meeting the region's important information, planning, and resource management needs;

- to recommend and undertake studies of region-wide or special importance in these areas.

Section 209 of the FWPCA Amendments of 1972 calls for preparation of "Level B" plans under the Water Resources Planning Act for all river basins in the U.S., to be completed by January 1, 1980. NERBC will be the agency which will be responsible for supervising this planning, which requires integrating water pollution control, land use and related environmental programs. The Commission will then have final responsibility for evaluating individual basin plans for consistency on a regional level before final recommendations are sent to the President.

c. Massachusetts Division of Water Resources

Like DWPC, the Division of Water Resources is located within the Department of Natural Resources and sits under the Water Resources Commission. Its functions include:

- coordination of water and related land resource activities of state, inter-state and regional agencies as they affect Massachusetts;

- formulation of state water use, development, and conservation objectives;

- conduct of special studies in water use area planning;

- construction of improvement works under the Watershed Protection and Flood Prevention Act (PL83-566);

- acquisition of reservoir sites;

- sponsorship of basic research in water resource problems.

d. Massachusetts Department of Community Affairs

DCA, through its Bureau of Regional Planning, has a general oversight and technical assistance responsibility for the individual regional planning agencies, including MVPC and NMAC. It is also the channel through which HUD 701 Comprehensive Planning funds are distributed to RPA's. Any effort to strengthen the planning and management capabilities of RPA's as a preclude to greater responsibilities in the area of wastewater planning will likely have to be implemented through the Bureau of Regional Planning. Massachusetts DCA will also ultimately be important to water quality management in the Merrimack basin

because of the key role which this agency will eventually play in regional land use planning and management. The Secretary of Communities and Development, who sits over DCA, also chairs the Resource Management Policy Council.

5. Related Legislation

a. Existing Statutes

Massachusetts Regional Planning Law

Chapter 40B, the Massachusetts Regional Planning Law, was enacted in May, 1955. Its purpose is to permit a city or town to plan jointly with other cities and towns to promote with the greatest efficiency and economy the coordinated and orderly development of the areas within their jurisdiction and the general welfare of their citizens. Any group of cities and towns may, by a vote of their respective city councils or town meetings, agree to form a regional planning district. The area of jurisdiction of the District must be approved by the Department of Communities and Development.

Chapter 40B requires that each town or city be represented on the Commission by a member of the local planning board. An alternate, without vote except in the absence of the representative, may be appointed by the mayor or board of selectmen. If no planning board exists, the mayor or board of selectmen is empowered to appoint the representative. These representatives are elected annually and elect from among their ranks a chairman, treasurer, and clerk. Other arrangements for representation to an RPA are possible when that agency is created by special enactment.

Each Commission must prepare an annual budget. Each member town or city is assessed proportionately, and this assessment is included in the tax levy for the year. The assessment is in direct proportion to the population and cannot exceed any per capita amount set by the town meeting or city council. The Commission may also receive funds from other sources, including state and federal government and private individuals and corporations.

Regional planning agencies are empowered to:

- make studies of the resources, problems, possibilities and needs of the district;

- based on these studies, develop a comprehensive plan of the district including land use, highways and bridges, airports, public facilities and utilities;

- assist the planning boards of the cities and towns within its jurisdiction in applying any district plans to the local level;

- appoint technical advisory committees, as appropriate, and contract with state agencies or private individuals for the completion of planning studies and services within the commission budget.

Before the adoption of any regional plan at least one public hearing must be held and each local planning board, board of selectmen, the city council must be notified. A plan must be adopted by a majority vote of the commission. All plans and other actions and recommendations of the commission are advisory only.

Industrial Pollution Control Authorities

Under Chapter 40D of the Massachusetts General Laws, municipalities individually or in combination may create public authorities empowered to lease pollution control services to industries. The state Industrial Finance Board must assent that such an authority could alleviate unemployment and produce a substantial public benefit; also, DWPC must find that the projects intended to provide waste treatment services serve to further its water pollution control objectives. Industrial pollution control authorities have considerable power to finance, construct and operate their own facilities. Financing is handled through the issuance of revenue bonds, payable from the revenues generated by the lease of the authority's facilities to industries.

Tax Abatement of Industrial Expenditures for Pollution Abatement Facilities

Under current Massachusetts law, corporations installing water pollution control facilities may, subject to certain technical restrictions, obtain income tax deductions (M.G.L., c. 23, §38D) and real property tax exemption (M.G.L., c. 59, §169).

Pollution control facilities in Massachusetts may qualify for accelerated depreciation under provisions of the federal Internal Revenue Code (Int. Rev. Code of 1954, §169).

Flood Disaster Protection Act of 1973

The Act substantially expands the National Flood Insurance Program, in order to provide better protection to the public and to reduce annual disaster assistance outlays through the increased availability of flood insurance. Specific purposes of the Act are to: (1) substantially increase the limits of the subsidized and unsubsidized flood insurance coverage; (2) provide for expeditious identification of flood prone areas; (3) require states or local communities, as a condition of future federal financial assistance, to participate in the flood insurance program; and (4) require the purchase of flood insurance by property owners who are being assisted by federal programs or by federally supervised, regulated or insured agencies in the acquisition or improvement of land or facilities located or to be located in identified areas having special flood hazards.

HUD must publish information on known flood-prone communities and notify them within six months of their tentative identification as such. Upon notification the community must either promptly apply for participation within a flood insurance program or satisfy the Secretary of HUD within six months that it is no longer flood-prone. A hearing may be granted to resolve disputed cases, but the Secretary's decision is final if supported by the record as a whole.

The Act prohibits federal financial assistance for acquisition or construction purposes within the identified flood-prone areas of communities that are not participating in the flood insurance program by July 1, 1975. Federal instrumentalities responsible for the supervision of lending institutions are directed to prohibit such institutions from making real estate or mobile home loans after July 1, 1975, in areas identified as having special flood hazards unless the community is participating in the flood insurance program. By joining the program, in addition to avoiding these penalties, the community receives a detailed mapping of its flood plan at no cost. Furthermore, flood plain property owners may purchase flood insurance at substantially reduced rates.

Wetlands Act

In Massachusetts, with limited exceptions, persons wishing to conduct any activity affecting wetlands, broadly defined, may not undertake that activity until such time as a "notice of intention" for that proposed activity has been cleared through an appropriate municipal agency and the state Department of Natural Resources (DNR) (MGL, c. 131, Section 40). This clearance procedure must be initiated prior to the time when all necessary local permits, variances, and approvals have been obtained, and entails a public hearing which must be held by the

municipality within three weeks of receiving the notice or intention. If after this hearing the municipality determines that the site of the proposed activity is significant from a water supply, flood control, pollution control, or other perspective, the municipality, within three weeks of the hearing, must issue a written order imposing such conditions as are necessary for the protection of those interests. The proposed activity must be carried out consistently with the terms of the order.

In the event that the applicant or any other person is aggrieved by the municipal order, or by the municipality's failure to issue an order or hold a hearing within the prescribed time, they may request that the DNR undertake its own review of the application. The DNR must issue its order within seventy days. Any order issued by the DNR supersedes a prior municipal order and dictates how the proposed activity is to be carried out.

Persons acquiring land upon which work has been done in violation of the Wetlands Act or in violation of any order issued thereunder may be ordered to restore the land to its original state. Violations of the Act are punishable, for each day of violation, by fines up to $1,000 or by imprisonment for up to six months.

Scenic and Recreational Rivers Act

The DNR, "for the purpose of promoting public safety, health and welfare, and protecting public and private property, wildlife, fresh water fisheries, and irreplaceable wild, scenic and recreational river resources" may adopt orders "regulating, restricting or prohibiting" activities in, near or affecting the "scenic and recreational rivers of the commonwealth." (MGL, c. 21, Section 17B). The DNR may, for the purposes of this section, restrict and classify waters and streams for their "scenic and recreational" values, and may identify contiguous land areas, not to exceed one hundred yards on either side of the natural bank of such river, as part of the "scenic and recreational" area to be protected.

Massachusetts Environmental Policy Act

Both federal and Massachusetts agencies undertaking activities that have a significant impact on the environment are required, by the terms of their respective "environmental policy" statutes, to prepare statements evaluating the nature of such environmental impacts.

Regarding its water quality management programs, there are only two instances in which EPA is required by the National Environmental Policy Act (NEPA) (42 U.S.C.A. §4321 et seq.) to prepare environmental impact statements: (a) construction of publicly-owned treatment

works under section 201; and (b) issuance of a new source discharge permit, as defined by section 306. No other actions of the EPA Administrator taken pursuant to PL 92-500 are "major federal actions significantly affecting the quality of the human environment" within the meaning of section 102(2)(c) of NEPA (see section 411(c)(1) of PL 92-500).

Under the Massachusetts Environmental Policy Act (MEPA) (M.G.L., c. 30, §61 and 62, as amended by Acts of 1973, c. 564, §16), the DWPC is exempt from having to prepare an environmental impact assessment pertaining to the construction of a publicly-owned treatment works for which an EIS is required under federal law. Also, no more detailed analysis is required for water pollution control projects which would be eligible for federal funds but which are undertaken with funds of the Commonwealth than would be required by federal law.

Private Right of Action Statute

When Massachusetts regulatory agencies fail to prevent environmental damage, Massachusetts law now permits private citizens and governmental units to bring suit, subject to certain procedural requirements, to enjoin the threatened damage.

Although the law does apply to a wide variety of possible environmental wrongs, unless the suing citizens can demonstrate that the threatened damage is such as to present an extraordinary public health threat, the citizens will not be able to enjoin actions conducted in good faith pursuant to a judicially-enforceable state pollution control plan. Under this statute, suing citizens may only sue to prevent further or threatened environmental damage; to recover money damages caused by the environmental wrong, they must resort to the traditional "nuisance" suit.

b. Pending Legislation

Land Use Policy and Planning Assistance Act of 1973

Various versions of a proposed national land use bill would provide federal technical and financial assistance to the states to enable them to exercise responsibility for the planning and management of land use activities which are of more than purely local concern. If this particular measure is enacted, each state would be required to develop within three (3) years a state-wide land use planning process, including an adequate data base, competent staff and an appropriate agency to coordinate planning at the state level. Within five (5) years

of enactment, the state would be required to produce a state land use program which focuses on critical areas, many of which are directly relevant to 208, 303(e) and 209 level planning; beaches, flood plains, wetlands, recreational lands and facilities, and other developments of "regional benefit". Institutional and financial arrangements for water quality management, particularly ones pointing to larger regional entities, would definitely be influenced by the necessary promulgation of state guidelines for land use decision-making regarding such water-related uses. The identity of the local or regional institutions designated by the state land use agency to implement the state guidelines would also be a matter of great interest to planners of institutional and financial arrangements.

Reorganization Bill for the Massachusetts Department of Environmental Affairs

As part of the program to reorganize Massachusetts state government agencies along more efficient lines, proposals have been submitted to reorganize the DWPC within a parent Secretariat, that for Environmental Affairs. The Environmental Affairs reorganization proposal would be effected in two phases: a basic restructuring of state agencies having jurisdiction over environmental matters, and a decentralization of state environmental activities into regional environmental services providing a coordinated approach to a broad range of environmental tasks performed now by unrelated state agencies.

DWPC would be placed under an Assistant Secretary for Environmental Quality, who would also be responsible for what is now the Division of Environmental Health within the Department of Public Health. What would remain to be worked out would be the regionalization of current DPWC and DPH powers regarding water quality management, and the relationship of these functions newly regionalized to inter-municipal districts or other alternative area-wide wastewater planning and management agencies.

Proposed Reform of Mass. Regional Planning Agencies

In recent years there have been a number of legislative proposals to amend Chapter 40B, the Massachusetts Regional Planning Law (refer back to section 1.5.1.1). Five such bills are currently in various stages of the legislative process. No attempt will be made here to treat each of these bills individually. In many respects the bills are similar in intent if not specific recommendations. One such bill, H5101, proposed by the Northern Middlesex Area Commission, will be discussed to provide perspective on the general movement to reform the RPA's.

H5101 would alter the representative structure of existing RPA's to make them generally more representative of political make-ups of their regions. Each member municipality would be entitled to two representatives on the commission, the first of whom would be an elected general purpose municipal official and the second a person elected by, and from within the membership of, the local planning board. Cities and towns would be entitled to one, two, three and in some cases four additional representatives depending on population. Again, the third and fourth representatives would have to be elected general purpose municipal officials, while the fifth and sixth could simply be registered voters chosen by the mayor or the chairman of the board of selectmen. Additional representation could be specifically allotted to any county governments and to "disadvantaged" and "minority" populations within the region. An executive committee would be chosen from within the commission empowered to make all but certain specified planning and administrative decisions.

The RPA as restructured would have the responsibility to develop comprehensive regional plans which, when certified by the Governor, would have authoritative rather than merely advisory status on matters which it deems to be of "regional significance". Any project or program of regional significance which an RPA finds to be inconsistent with certified comprehensive regional plans shall not be pursued by a state agency, or political sub-division thereof, except under such conditions as the RPA itself shall impose. The bill lays out eight criteria for judging whether a project is of "regional significance", which emphasize impacts and effects which spill over the boundaries of just one member municipality (or across RPA boundaries). Also, the new RPA's would have important, but not authoritative, review and comment powers over "all federal programs requiring participation of any agency with areawide planning and review powers on federal programs which, in the opinion of the regional planning agency, have areawide or district-wide implications".

The bill anticipates the issue of 208 planning agency designation by requiring that wherever federal or state legislation provides for participation by an agency with areawide or district-wide jurisdiction in any proposed action, the governor shall designate the appropriate regional planning agency as the participatory agency.

Proposed Reform of Mass. County Government

Currently there are a large number of House and Senate bills pending which deal in one fashion or another with the power of county government. At latest count three bills call for the abolition of county government, another three for state assumption of the costs of county government, two more to "modernize" county government structure, fully eleven more to make changes in one or more specific county functions.

Again, no attempt will be made here to deal with these proposals individually. Suggested changes to county governments include the election of a county legislature, restructuring of county boundaries to conform to present "regional" configurations, and assumption by the counties of many activities, such as sewage disposal and economic development, now performed by municipalities and regional planning agencies.

B. THE WASTEWATER MANAGEMENT PROPOSALS AND THE EXISTING INSTITUTIONAL STRUCTURE

We turn next to considering how existing institutions might set about to implement recommendations of the MWM Study. Our purpose here cannot be to examine all the institutional or administrative dimensions of wastewater management along the Merrimack--a task that would call for a sizeable volume in its own right--but to concentrate on the salient points where institutional structures or processes will be called upon to bridge the gap between the needs identified in this study and their fulfillment in fact.

Our conclusion can be briefly stated: the modest and relatively decentralized arrangements envisaged in the study's recommended engineering plans could be implemented with little or no change in existing institutions, though perhaps not without difficulty at several points which we will identify and discuss. The more highly centralized or land-oriented alternatives would, we believe, encounter greater institutional obstacles than the ones that the study recommends for adoption. Thus the recommended plans, apart from their technical virtues, also have the advantage, in our judgement, of being relatively feasible from an institutional point of view, without necessarily calling for fundamental reforms of current institutional structures or processes.

Secondly, the needs identified in the study for land-use controls oriented (in part) toward protection of water quality can also be met within the context of current institutional arrangements, if the will and the imagination are forthcoming to use them to that end.

1. Implementing the Recommended Plans: In General

a. Basin, Regional and Project Planning

The MWM Study is not per se an exercise of official planning under the relevant sections 303(e), 208 or 201 of the Federal Act and sections 27(10) and 32 of the MCWA. Rather, the study advances engineering proposals, with supporting data, for inclusion in such planning at the appropriate time. Since official plans developed under those provisions are a prerequisite to implementation of any wastewater management scheme, we consider first the planning phase of water quality control.

It would be necessary to secure DWPC's cooperation in fashioning its official 303(e) basin plan for the Merrimack mainstem so as to reflect the study's recommended plans, or at least so as to contain no requirements that were incompatible with them. If these plans represent, as the study avers, cost-effective strategies for meeting water quality standards through application of best practicable treatment technologies, the chances of securing their recognition in the basin plan should be reasonably good.[1]

The significance of getting the study's recommendations included in the 303(e) plan is primarily two fold: it means that discharge permits under section 402 of the Federal Act and section 43 of the MCWA are likely to be issued (or reissued) for the proposed facilities, and that federal and state grants, totalling 90% of eligible construction costs, are likely to be awarded at the appropriate time.[2]

Of no less significance is the optimistic outlook, as of this time, that the two RPAs on the Merrimack mainstem will be designated as 208 planning agencies with respect to most (if not all) of the municipalities within their respective jurisdictions 208 is the section of the Federal Act that provides for comprehensive, integrated waste management and water-related land-use planning, covering point and non-point sources, in areas with substantial problems of water quality control resulting from urban-industrial concentrations or other factors. The statutorily preferred vehicle for such planning is a single organization representative of the 208 area, including elected officials from local government or their designees. RPAs are obvious candidates for designation by the Governor under this section.

Federal grants covering 100% of 208 planning expenses over a two-year period have been released by OMB and are in the offing during fiscal 1975. At the same time, EPA has begun to interpret its 208 eligibility requirements in flexible and workable ways, which are likely to benefit RPAs in their quest for 208 designation. Thus, the boundaries of a 208 area[3] may extend considerably beyond the core of urban-industrial concentration, to outlying areas where anticipated growth is expected to cause water quality problems. At the moment, in fact, only Boxford, Rowley and Newbury in the MVPC and Pepperell and Dunstable in the NMAC appear to be excluded from tentative 208 area designations. And even these towns may yet qualify for inclusion. So the prospects are hopeful for a rough (if not an exact) territorial congruity between the 208 planning agencies and the areas for which they would plan. If the five towns mentioned above are finally excluded, the RPAs could still plan for them simultaneously and in conjunction with the 208 areas, using supplementary funds from some source other than 208.[4]

Moreover, EPA no longer flatly requires that all local governments within a 208 area assent to designation of the proposed planning agency and agree in advance to be bound by whatever plan may emerge. It will be sufficient if there is substantial support on the part of member municipalities for joining in a cooperative effort under the RPA's leadership, "to develop a plan and once the plan is adopted to proceed towards its implementation..."[5] Whether such support exists will shortly be put to the test through resolutions of intent to be considered by cities and towns within the jurisdictions of the two RPAs. At least three major factors will favor a showing of municipal support for the RPAs: the availability of funds under 208 covering 100% of the cost of planning for control of municipal wastes, the cost-effectiveness of such plans when developed on a regional basis, and

the implicit threat that the state itself will take over wastewater management planning in any area that is unable to agree upon its own 208 planning agency.[6]

In addition to their locally representative character, the two RPAs can maintain that they meet other federal eligibility criteria for designation under 208.[7] They have general authority to prepare regional plans, albeit of a largely advisory nature, and have demonstrated both their experience in resource and development planning and their ability to secure implementation of such plans. Moreover, the RPAs have historically maintained close working relationships with other planning and development agencies at all levels of government, and either have or could shortly acquire the necessary expertise to conduct or to supervise conceptual waste-management planning. Nobody claims that the track record of the RPAs to date is perfect, nor that their composition and role could not be improved, but flawless institutions cannot reasonably be demanded under 208 (or, for that matter, in any other field or program).

If the RPAs are designated by the Governor and approved by EPA under section 208, they could incorporate the recommended plans of the MWM Study--in whose formulation they themselves have actively participated--directly into the 208 plans in considerably less time than would otherwise have been required. There is no guarantee that the official plans will emerge in exactly the form projected by the survey, but a substantial similarity can reasonably be anticipated. Of course, a full 208 plan must also designate management agencies and regulatory programs to control land uses that affect water quality. Other findings and recommendations of the MWM Study can be drawn upon by the RPAs for guidance in accomplishing these planning tasks. In general, then, the output of the study should greatly assist the RPAs in producing acceptable 208 plans within the three-year period allotted under that section.[8]

Once a 208 plan has been adopted by the RPA, approved by DWPC, certified by the Governor, and approved by EPA, the plan will have the force of law in at least two major respects: (1) no discharge permit under section 402 of the Federal Act or section 43 of the MCWA shall be issued for any point source that is in conflict with such a plan; and (2) no construction grant under section 201(g)(1) of the Federal Act or section 33 of the MCWA may be awarded except to a management agency designated in, and for a project conforming with, such plan.[9]

Since the mandatory status of a 208 plan conflicts with the advisory role traditionally played by RPAs, they will face some delicate questions of planning procedures. Eligibility for 208 designation is conditioned, in the first place, upon the agency's having established "procedures for plan adoption and resolution of major issues".[10] So these problems will have to be confronted early in the designation process. They could be exacerbated, moreover, by lack of unanimity among member municipalities over the proposed RPA designations. By and large,

RPAs have attempted to function on a consensual basis, avoiding dissenting votes wherever possible. In the preparation of a 208 plan, they would no doubt continue this salutary practice. In fact, their ability to maximize local consensus is the strongest argument in favor of giving them the 208 planning role. But it cannot be assumed that the unanimous assent of member municipalities to all aspects of an adequate 208 plan will in fact be secured. Some conflict-resolving mechanism may therefore be necessary, even if it means overruling minority interests.

By statute, RPAs are directed to decide upon adoption of plans by "majority" vote. It seems clear, however, that a 208 plan should not be deemed to be adopted merely because it is approved by a majority of the affected municipalities, all of whom have equal votes on the RPA Commission regardless of population. The RPAs might instead decide not to put a plan to the vote until a really convincing majority appears to favor it. Or perhaps the majority-vote requirement could be construed as permitting the Commission to decide by weighted votes or special majorities, if its by-laws so prescribe. In any event, this procedural matter needs to be resolved before the RPA can be designated under 208.

It is not yet entirely clear how regional planning under 208 will mesh with basin planning under 303(e), beyond the legal requirements that each must take cognizance of and be compatible with the other. DWPC is expected to consult closely with the concerned RPAs and to reflect their inputs in formulating its basin plans. These need not, however, pre-empt the 208 planning process by attempting to decide the number, types, locations and service areas of future wastewater management facilities. When 208 is activated, such planning should be done in detail by the 208 planning agency. At the same time, the 303(e) plan can recommend basic engineering strategies for meeting water quality standards and effluent limitations in cost-effective ways. 208 plans will have to secure DWPC's approval for purposes of discharge permits and construction grants, so the Division may as well outline in its basin plan whatever engineering configurations it may be inclined to favor, before 208 planning gets underway. Later on, the 303(e) plan could be amended to take account of new findings or conclusions developed in the course of 208 planning. Thus an interactive, iterative relationship can be envisaged between the respective plans of state and regional agencies as the overall planning process unfolds.

Section 201 of the Federal Act is the third major planning section that needs to be fitted into the picture. Management agencies designated by a 208 plan would be eligible to receive 201 funds to prepare engineering reports, designs and specifications for facilities which the 208 plan calls upon those agencies to build. If for any reason 208 is not used, 201 may additionally serve as the vehicle for preliminary conceptual planning--for determining the basic components of a cost-effective areawide control strategy that takes both point and nonpoint sources into account. In that event, the recommendations of the MWM Study could be implemented through sections 303(e) and 201.

First, they would be incorporated into a 303(e) basin plan. Then municipalities or intermunicipal districts would apply under 201 for grants to design and build the facilities envisaged in particular parts of the plan. Section 208, then, is not indispensable to implementation of the engineering alternatives which the study recommends.

b. Wastewater Management Agencies

In the MWM Study area, as throughout the state beyond metropolitan Boston, responsibility for construction and operation of public waste treatment facilities resides with the several cities and towns. Thus the municipalities in the basin, whether or not by 208 designation, would be called upon to implement major portions of the study's recommended plans. In almost all cases, these envisage joint arrangements between two or more municipalities for treatment of their sewered wastes. A choice of cooperative techniques is available to them in this regard: they may choose to form intermunicipal sanitary or pollution-abatement districts, or more simply, they may conclude contractual agreements with one another.[11]

Districts, which are really special-purpose governments, are perhaps most appropriate for joint intermunicipal ventures to plan, build and operate new treatment plants, where no single city or town in the proposed alliance is so large as to be assured of dominating all the others. For example, the proposed tying of Chelmsford, Westford and Tyngsborough into an entirely new facility to serve all three towns might suitably be managed through formation of a district. The Greater Lawrence Sanitary District is the only intermunicipal district that has been formed so far in the Merrimack Basin. It was created by special Act of the Legislature, Tailor-made to reflect the constitutional terms on which the four members finally agreed after protracted negotiations. Districts may also come into being without recourse to the Legislature, pursuant to MCWA sections 28-29. Voluntary formation of a district under section 28 may appeal to a group of municipalities who find acceptable the prescribed formula of section 29 for representation on the district commission: two members at least from each municipality, plus a third for any city or town with a population between 20 and 50 thousand, plus a fourth for any with a population over 50 thousand. It should also be noted that, under recent amendments[12] to these sections, DWPC now has the power to mandate the formation of districts "consisting of one or more cities or towns" and to appoint the three commissioners who shall govern such a district. This is a weighty administrative power that would be used only sparingly and in the last resort, if all efforts at persuasion should fail to produce intermunicipal cooperation in preparing and implementing 208 or other regional waste treatment plans.

For most of the cities and towns covered by the study's recommended plans, intermunicipal service contracts would probably make better sense than districts and should be easier to negotiate. There are two considerations, either or both of which would tend to favor contracting

over districting: (1) a treatment facility is already in place and being operated by a particular municipality, which may be expected to upgrade it for future service to two or more municipalities upon agreeable terms for cost-sharing; (2) the municipality that has or will have the treatment facility is considerably larger and will acount for greater flows than each of the other cities and towns to be served by the facility. In such cases, agreements among the concerned cities and towns can provide for additions to the plant, permissible peak flows from each contributing municipality, apportionment of capital and operating costs, timing of payments, location of connections between sewer systems, enforcement of pretreatment standards with respect to all industrial users, monitoring measures, and other mutual obligations.

Service contracts between municipalities and substantial industrial waste contributors are also a rather common device, especially where the size of a new municipal treatment plant will depend upon whether it handles wastes from one or more major industries. For smaller industrial sources tying into publicly owned collection and treatment systems, municipal sewer ordinances requiring pretreatment, monitoring and submission to inspection will ordinarily suffice. Federal law in effect requires all receiving municipalities or districts to have such ordinances and to enforce them.[13] Where a district receives mixed industrial and residential wastes from one or more municipalities, the necessary regulatory authority can be lodged by agreement at either the municipal or the district level. Administration of both sewer ordinances and user charges at the municipal level would be more in accordance with prevailing political sentiment. At either level, such regulation is clearly authorized by state law.[14]

Thus contracts or districts are the principal legal devices for bringing into being and activating the management entities that will be needed to implement the study's recommended plans. Where districts are formed, they will finance, build and operate the new regional treatment facilities, leaving collection systems in the hands of the individual municipalities. Where contracts are concluded, the municipality with the existing or proposed treatment facility will be the entity designated to manage it on behalf of all the interested parties. The choice of management entities can be as simple as this, both for the near term and the longer term.

All intermunicipal and joint municipal industrial arrangements for wastewater treatment should secure approval of the DWPC before they are finalized. The DWPC would review them for consistency with basin and regional plans, discharge permit requirements, and construction grant prerequisites. The terms of every such contract or district should allow or provide for compliance with all relevant provisions of federal and state law, including a degree of treatment sufficient to meet applicable effluent standards or limitations within the prescribed time; systems for implementing industrial cost recovery, user charges, and

pretreatment standards; safeguards against overloading of the treatment works or other violations of permit conditions; and assurances of proper operation and maintenance.

c. Fiscal Dimensions of Wastewater Management

Within limits of available appropriations, and subject to priorities for abatement established in the state's program plans and basin plans, EPA will make grants to cover 75% of the eligible cost of constructing approved treatment facilities.[15] The state will provide another 15% under amended provisions of the MCWA.[16] That leaves a 10% local share, which is customarily raised in this state by floating general obligation bonds backed by the credit of one or more individual municipalities. Where districts have been formed, district bonds are issued, shares of debt service costs are apportioned among the member cities and towns, and the local assessors are then required by law, without further vote, to include the apportioned shares in the amounts to be annually raised by municipal property taxes. Appointed district boards ordinarily would not balk at issuing bonds to fund local shares of construction costs, but town meetings and city councils, with whom the decision rests when no district has been formed, have not proven quite so cooperative. If recent history is any guide, there will be a substantial risk that the locality, especially if it is governed by town meeting, will reject the warrant for an appropriation to fund the necessary local share. Such rejections have been known to delay construction projects for years. Presumably, however, if a project has been included in a 208 plan to which the affected municipality has assented, it will not turn down the warrant. But if it persists in doing so, DWPC can resort to several enforcement techniques at its disposal to get the town to change its collective mind: sewer bans, mandatory districting, or prosecution in the courts for violation of deadlines or other conditions specified in the town's discharge permit. The same techniques would be available in the event a municipality failed to approve a budget or to appropriate funds in sufficient amounts to meet high standards of operation and maintenance of treatment facilities, as will be required by the terms of all discharge permits. Thus the prospects seem fairly good that, by voluntary or compulsory means, municipalities will raise their local shares for new projects when the time comes for them to do so.

Cities and towns customarily use proceeds from local property taxes to meet carrying charges on their bonds. There is no reason why they should not continue to do so for projects specified in a 208 plan. Hitherto, property taxes have also been used by some municipalities to meet costs of operating and maintaining treatment facilities, but the requirement of the Federal Act, as interpreted by a recent ruling of OMB, is that federal construction grants may not hereafter be awarded unless the grant applicant adopts a system of user charges designed "to assure that each recipient of waste treatment services...will pay its proportionate share of the costs of operation and maintenance (including replacement) of any waste treatment services provided by the applicant..."[17]

Proportionality in this context must rest upon analysis or estimation of wasteload characteristics (both volume and strengths as they affect costs of treatment. So relatively sophisticated techniques will have to be employed to measure or estimate and, where industrial wastes are involved, to monitor waste inputs from all sources to publicly owned treatment systems. Such techniques will also be necessary for industrial cost recovery. In this connection, the Federal Act provides that no construction grant may be awarded unless the applicant "has made provision for the payment to such applicant by the industrial users of the treatment works, of that portion of the cost of construction...which is allocable to the treatment of such industrial wastes to the extent attributable to the Federal share of the cost of construction..."[18]

How will user charge and cost recovery systems be administered in the case of a treatment facility that serves two or more municipalities? The district or municipality that operates the facility would annually calculate the contribution of sewage and industrial wastes from each municipality served by the facility, and apportion the related costs accordingly among the respective municipal contributors. Each municipality would then raise these amounts by assessing the ultimate users located within its boundaries, according to the volume and strengths of their respective waste inputs to the metropolitan system, and remit the proceeds to the operating entity. For sources contributing only sanitary sewage, the sewer use charge could probably be calculated on the basis of water consumption and be added to the water bill. For industrial users, the calculation would have to be more closely tailored to the nature of the waste at each source, but could be simplified somewhat by recognizing several classes of users according to their typical wasteload characteristics and by applying a uniform rate of charge to all members within each class. Here too the charge could be added to the water bill. Thus no separate administrative machinery need be established for collection of user charges and industrial cost recoveries.[19]

Additional administrative expenses will have to be incurred at the municipal level, however, in order to make the necessary calculations and assessments and to monitor industrial connections. Technical assistance should be available in this connection from EPA and DWPC. Moreover, the data base developed for implementing the foregoing fiscal requirements can also be used by districts and municipalities (i) in monitoring their own compliance with their discharge permits,[20] and (ii) in administering regulatory permit programs for sewer connections and extensions--especially where industrial wastes subject to pretreatment requirements are involved--in any case where DWPC delegates such administrative responsibility to a qualifying district or municipality.[21]

Federal law further specifies that the grantee shall retain 50% of the revenues it receives from industrial cost recoveries, and earmark 80% of the retained amounts "for future expansion and reconstruction of the project."[22] For publicly owned facilities treating substantial inputs of industrial waste, this provision will furnish some financial

assistance, quite apart from any future federal grants, toward upgrading secondary treatment to AWT facilities, as envisaged at a number of locations by the study's recommended plans.

d. Regulatory Process for Implementation and Enforcement

For all municipal and industrial point sources, discharge permits issued under section 402 of the Federal Act and section 43 of the MCWA[23] will be the principal regulatory tool for translating basin and regional plans into sets of legally enforceable requirements. For every treatment facility and point of disposal to ground[24] or surface waters envisaged in the study's recommended plan, a discharge permit will have to be obtained. This will be true even where so-called "zero-discharge" facilities are planned, since (i) the concerned sources will need permission to continue discharging until their ZD facilities become operational, and (ii) ZD facilities themselves may discharge some trace of pollutants by design or otherwise, so will continue to be covered by permits at least for purposes of O&M and surveillance. Discharge permits will specify effluent limitations (i.e., restrictions on waste discharges); timetables where appropriate for compliance with those limits through application of best practicable or best available treatment technology; and requirements of facility monitoring, reporting, submission to inspection, and controls over the volume and strengths of waste additions to treatment systems (including pretreatment standards), designed to promote proper operation and maintenance. A discharger who fails to secure a permit or who knowingly or negligently violates any term of his permit will be subject to severe civil and criminal sanctions, including both fines and injunctions, upon a finding of liability in a court of law.[25] Moreover, DWPC could revoke an issued permit for cause; impose a sewer ban (as it has occasionally done) by refusing to grant permits for further sewer connections and extensions to an offending municipality until the violation is corrected; declare a mandatory district of one or more cities and towns and appoint the commissioners, who would then be empowered to take steps to correct the situation; or, in case of an industrial discharger, order him to cease and desist from making further dischargers until he has taken the necessary corrective action. The terms of a discharge permit to a municipality may also require it to plan sufficiently in advance for the addition of new treatment capacity as its existing plant moves toward being used to full capacity, on pain of a sewer ban unless such a step is taken when needed. These are powerful remedies; hopefully, they will not have to be employed. The possibility of employing them, however, may go far toward assuring that serious permit violations do not occur, such as refusal to appropriate local construction funds, faulty operation of treatment plants, or failure to prevent collection and treatment systems from becoming overloaded. Thus the discharge permit system, as currently established under federal and state law, will be the principal vehicle for securing implementation or enforcement of abatement plans as well as quality control over ongoing operation and maintenance of wastewater management systems.

Ideally, planning should precede permitting. The Federal Act is being implemented, however, in the reverse order, through issuance of individual discharge permits before completion of basin and regional plans. These should be in place before permits are reissued in 1977, calling for further progress toward the 1983 and 1985 goals of high water quality. But in the meantime, the participants in this study would be well advised to monitor proposed permit issuances for consistency with the study's recommended plans, and to point out any inconsistencies to EPA and DWPC. Once a municipality or industry embarks on a particular course of action under a discharge permit, it may be difficult to change direction later on.

Under section 43 of the MCWA, as already noted, the DWPC is authorized to regulate all sewer connections and extensions by means of a separate permit system. The DWPC need not wait until a violation of a discharge permit has occurred before conditioning further extension or connection permits upon local progress towards enlarging or upgrading collection and treatment systems where necessary to handle expected increases in flow. Adequacy of the system and programs for proper operation and maintenance are also conditions upon which both EPA and DWPC will insist, before they award construction grants to publicly owned treatment facilities.

e. Land-Use Dimensions of Water Quality Management

Plans prepared under Section 208 of the Federal Act will be land use plans in large part. They will represent a cost-effective mix of structural measures (collection and treatment facilities) and non-structural measures--especially land-use and nonpoint source controls--for achieving water quality objectives. They will serve, moreover, as guides for development, reflecting not merely factual projections of future growth, but policies for timing and channeling it within the 208 area. Consider the following implications of a 208 plan:

- It will prefigure the usage of land required for the wastewater management system itself, locating its major components. The plan may well indicate which sites and which rights of way are the appropriate ones for new transmission and treatment facilities.

- By determining locations, sizes, interconnections and construction schedules for wastewater management facilities, the plan will prefigure the direction and pace of future residential and economic growth. It will encourage growth in locations that will be served by sewers and treatment plants, and discourage it elsewhere.

- The plan must establish a program for regulating the locations of all "facilities"--apparently including any sort of development--that may result in point or nonpoint discharges within the area.[26] What this

means, by and large, is that development should be permitted only where adequate wastewater control or disposal facilities are available. Further, it may mean that development should be positively restricted in sensitive areas--such as wetlands, floodplains, steep slopes and aquifer recharge zones--where it is most likely to have detrimental effects on the water resource.

- The plan must provide for the control of nonpoint sources of pollution in general,[27] and of agricultural and construction-related sources in particular. To control such sources, it may be necessary not only to institute performance standards for permissible uses, but to restrict or prohibit particular uses in sensitive areas and to preserve some of these areas as open spaces in their natural state.

- The plan must provide for controlling land disposal of residual wastes and of other pollutants that might impair ground or surface water quality. Septic tanks, dumps, scavenging and disposal of septage are the principal operations to be considered here. Performance standards will have to be implemented, but also controls over the location of disposal sites.

As noted repeatedly in the options set forth by the study's recommended plans, failure to implement effective land use controls for protection of water quality in unsewered communities will eventually necessitate construction of sewers and treatment plants at public expense to deal with the growing volume of their wastes.

Those parts of a 208 plan which relate to point sources will be enforced through the requirements that all discharge permits and construction grants must conform to the plan. There is no assurance, however, that other kinds of development permitted, subsidized or undertaken by agencies at any level of government or by private developers will be compatible with such a plan. Most municipalities in the 208 area will have resolved to "proceed toward its implementation" and the RPAs can help protect its integrity through A-95 reviews and project certifications, but a largely voluntary effort will be required at all levels in order to harmonize the pace and pattern of future development with the measures set forth in the 208 plan for water quality management. It could easily be undermined if other elements of the region's capital infrastructure--transportation facilities, housing, shopping centers, and so forth--were to be built and operated at times, in places or in ways that violated the criteria or undermined the commitments set forth in that plan. In fact, implementation of 208 plans (or of comparable plans for non-208 areas) presupposes that they will have been prepared and will subsequently be considered in the context of all other land-use decisions affecting the region.

But except for point-source discharges, there is no unified framework of existing law that could serve to direct and to coordinate strategies for controlling land use in relation to water quality. Institutional techniques are at hand, but marshalling them will be like trying to assemble the many pieces of a complicated jigsaw puzzle, with the further absence of any assurance that they can in fact be fitted together to form a coherent whole. Short of significant institutional reform, it will be a difficult task--but by no means an impossible one.

Municipal land-use strategies will be integral components of 208 plans. Working together through the RPA in the 208 planning process, municipalities will seek to harmonize the regional water-quality implications of their respective land-use preferences. It is primarily at the municipal level itself that the necessary controls will be found over uses of land that would otherwise impair the quality of ground or surface waters.

A promising general approach for municipalities to follow, which includes but goes well beyond wastewater management planning, was outlined in the celebrated Ramapo case decided by the New York Court of Appeals in 1972.[28] In an effort to regulate its own development, the Town of Ramapo had adopted a master plan, a comprehensive zoning ordinance, and an 18-year capital budget to provide the necessary municipal services for maximum projected growth in conformity with the plan over that period. In essence, the ordinance provided that residential development was to be permitted only as adequate municipal facilities and services--including wastewater management capacity--became available, with the assurance that any concomitant restraint upon property uses was to be only of a temporary nature. The purpose (apart from the effect) of this technique was not to restrict population growth per se but to implement "a sequential development policy commensurate with progressing availability and capacity of public facilities."

Noting "the municipalities' recognized authority to determine the lines along which local development shall proceed," and assuming that the town would in good faith develop the facilities prescribed in its capital plan, the Court held that the town's ordinance was authorized by the State's zoning-enabling law, and that the development restrictions imposed by the ordinance were not takings of property for which compensation would constitutionally be required.

> "In sum, Ramapo asks not that it be left alone, but only that it be allowed to prevent the kind of deterioration that has transformed well-ordered and thriving residential communities into blighted ghettos with attendant hazards to health, security and social stability..."
> "We only require that communities confront the challenge of population growth with open doors. Where in grappling with that problem, the community undertakes, by imposing temporary restrictions upon development, to provide required municipal services in a rational manner, courts are rightfully reluctant to strike down such schemes."

Ramapo is a landmark case because it is apparently the first in this country that upholds the right of a community to restrict its own development through careful exercise of its planning and zoning powers, without having to compensate owners for losses in current property values occasioned by forced postponement of their development rights. No longer need the pace and pattern of growth in a community be decided by private developers and speculators in the free exercise of their own profit motives. If a community commits itself to a long-range capital investment program that does not appear to be a mere guise for halting growth or excluding people, it may limit development to areas served by public facilities and thereby regulate the rate and direction of growth in accordance with such a program. Moreover, as in the case of Ramapo, a community may regulate its development in accordance with a master plan that identifies areas to be preserved in their natural state, with concurrent requirements respecting average density, cluster zoning, and development easements designed to preserve open space and to facilitate the provision of public amenities.

The majority opinion in Ramapo was criticized by Judge Breitel in his thoughtful dissent. He characterized the town's ordinance as a "moratorium on land development", and noted that some of the needed facilities would not be installed for 18 years, with the consequence of freezing some owners' property uses for an equally long time. In his opinion, the zoning enabling law did not authorize such severe temporal restrictions. Principally, Judge Breitel objected to letting mere local ordinances, which inevitably reflect "a parochial stance without regard to...impact on the region or the state," deal ad hoc with conflicts that have arisen on a much larger scale between population pressure and environmental quality. He believed these issues should be resolved "at a regional or state level, usually with local administration, and not by compounding the conflict with idiosyncratic municipal action." Municipalities were in no position to consider the far-reaching social and economic impacts of a series of Ramapo type ordinances; their adoption by all towns might well have the effect of "destroying the economy and channeling the demographic course of the state to suit their own insular interests." In short, "the Ramapos, in isolation, cannot solve their problems alone, legally, under existing laws, or socially, politically, or economically." Even the majority opinion conceded that local autonomy over land use had distorted metropolitan growth patterns and crippled efforts toward regional and statewide problem-solving in a variety of related fields, including environmental quality control, housing and public transportation. Only state or regional controls could assure a sufficiently broad focus in charting land use policies.

It is significant that the doubts which the majority opinion had to overcome and the objections raised by Judge Breitel in dissent would largely have been met if Ramapo's plan had been prepared as part of, and had been integrated into, a larger regional plan for reconciling regional growth with environmental protection, as 208 plans will attempt to do.

In January of 1974, a U.S. District Court in California handed down another decision of far-reaching implications in this field. Not far from San Francisco lies the City of Petaluma, whose population had mushroomed like Ramapo's. In a special election held in 1972, the city's residents approved by a vote of 4 to 1 an ordinance declaring that for the next five years, the city would permit the addition of, and extend water and sewer services to, not more than 500 new units per year. The ordinance was defended on grounds similar to Ramapo's: that the city was entitled to regulate its growth consistently with its capacity to provide the necessary utilities.

But when a group of land and real estate developers, claiming to represent the region as a whole, challenged the ordinance in a suit against the city, the court found in their favor. "No city," it held, "may regulate its population growth numerically so as to preclude residents of any other area from traveling into the region and settling there." People have a constitutional right to travel and live wherever they wish, and every city has to accept its fair share of the population explosion. The court evidently bought the plaintiff's argument that, just as a telephone company could not decline to install more telephones, so a city is obliged to provide public utilities for whatever population it in fact acquires. The purpose of government, so the court implied, is to serve immediate human needs, not to control them in favor of longer-range objectives. The decision is now on appeal, and will probably go all the way to the U.S. Supreme Court because of the importance of the issues involved.

In view of the striking similarities between the Ramapo and Petaluma cases, it is not clear why they were decided differently or whether they can be squared convincingly on any ground. Clarification must await further decisions of the courts and the legislatures. It is interesting to note, however, that plaintiff's attorney in the Petaluma case, picking up a thread from Ramapo, advanced the argument that growth might be controlled on a regional scale to a greater extent than on a purely local one. There are suggestions in both cases that municipalities, far from sacrificing their local autonomy, may actually increase their power to control their own destinies by committing themselves to a regional planning process. And one phase of such a process could well be planning under section 208 of the Federal Act.

Whether the Massachusetts courts will agree with Ramapo remains to be seen. But if not ultimately overruled by federal law, it will remain a powerful precedent that can be cited in the courts of any state. The cities and towns of Massachusetts have all the powers that Ramapo used with decisive effect and could coordinate their exercise in comparable fashion.

Or municipalities might prefer to make more cautious use of their land-use powers, singly or in combination. These are more extensive than is generally appreciated. They include:

- The power to plan and implement plans for community development together with the necessary capital infrastructure, especially (for present purposes) wastewater management systems. Municipalities may coordinate these systems with other components of growth, in part through administration of local permits for construction of various kinds and for hook-ups to sewer lines.[29] If sewer capacity is unavailable and land disposal of wastes is infeasible for a proposed site, the municipality need not and should not permit a development to proceed.

- The power to control land use and development density through zoning,[30] subdivision controls,[31] and related techniques. Besides traditional zoning (which is designed to protect property values by assuring compatibility of uses within a designated zone), there are other, relatively new techniques which may assist directly in preserving high water quality: flood-plain zoning,[32] cluster zoning and planned-unit development,[33] and environmental impact zoning,[34] any of which can be administered in part through special permits. In addition to protecting wetlands under the wetlands protection laws,[35] a municipality may identify zones of critical environmental concern and administer special permits for development therein, which will be granted only on condition that the development is of such a nature, and will be accompanied by such protective measures, as the local permitting authority deems necessary to protect water quality or to preserve natural systems on which water quality depends.[36]

- The related power to establish and enforce performance standards with respect to land uses and land-disturbing activities. Through local ordinances and permit systems, municipalities may impose requirements for control of run-off from earth removal operations,[37] construction sites, hillside developments, and other nonpoint sources. Extensive drainage requirements may be imposed through municipal subdivision regulations.[38] Local review of site plans and local building and housing codes are further vehicles through which permissible uses can be conditioned upon compliance with performance criteria designed in part for the protection of water quality.[39]

- The power to enforce the health laws. Municipalities have primary responsibility for administering and enforcing Article XI of the State Sanitary Code, which regulates the disposal of sewage in unsewered areas (especially via septic tanks), the operation of sanitary

landfills, and the operations of scavengers. Local permits are required by law for these activities. Such permits may and should be conditioned upon locational criteria and standards for construction, operation and maintenance that will serve to prevent pollution of ground or surface waters.[40]

- The power to acquire lands or interests in land. Municipalities may purchase properties within their borders for conservation or recreation, sometimes with financial assistance from the State or Federal Government.[41] Land may also be donated for such purposes by outright gift or by gift in trust. And, of course, municipalities may take by eminent domain upon reasonable compensation to the landowner. Alternatively, and at lesser expense, municipalities may acquire less than fee simple interests in lands, through the techniques of conservation restriction[42] or sale-and-leaseback. All such acquisitions may serve to protect land from incompatible developments that would impact adversely upon water quality.

- The power to offer fiscal inducements for using land in ways that will protect the environment. Foremost among these are provisions affording property-tax relief for the maintenance of lands in agricultural or silvicultural use.[43] Deductions from income taxes may be taken by owners who donate lands or conservation easements to municipalities. Developers may be influenced in their plans by various economic incentives or disincentives held out to them by local agencies that are empowered to pass upon development proposals.44

Turnpike Realty Co., v. Dedham[45] is a leading case that illustrates the reach of municipal power in this field. At its 1963 Town Meeting, Dedham adopted a zoning by-law establishing a flood plain district which included land of the petitioner that had previously been zoned residential. As stated in the by-law, the purpose of the flood plain district was:

> "to preserve and maintain the ground water table; to protect the public health and safety, persons and property against the hazards of flood water inundation; for the protection of the community against the costs which may be incurred when unsuitable development occurs in swamps, marshes, along water courses, or in areas subject to floods; and to conserve natural conditions, wildlife, and open spaces for the education, recreation and general welfare of the public."

The by-law provided that, within such a district, no structure could be erected and no premises used except for agricultural, silvicultural or recreational purposes, and that conforming structures would be permitted on approval of the local Zoning Board of Appeals. Except for previously existing dwellings, sustained human occupancy in the district was prohibited, as were landfills, dumps, and drainage other than approved flood control works. Petitioner, whose land was seriously reduced in value because of the by-law, attacked it as beyond the authority granted to municipalities by the Zoning Enabling Act and as confiscatory on constitutional grounds.

The Supreme Judicial Court upheld the by-law as a valid exercise of municipal power, concluding that a local ordinance restricting use of a flood plain in order to reduce damages from anticipated floods might also, through the same set of restrictions, seek to "conserve natural conditions, wild life, and open spaces" and to prevent depletion of groundwater supply. Moreover, the Court pointedly declined to conclude, "even though the [trial] judge found that there was a substantial diminution in the value of the petitioners' land, that the decrease was such as to render it an unconstitutional deprivation of its property."

Had the ordinance at issue been designed primarily for the protection of water quality, one can predict that the Court would likehave decided the case in favor of the municipality. For it clearly lies within the local police power to protect the integrity of water resources for the health, welfare and convenience of the public. Nor will land-use restrictions reasonably designed for this purpose be invalidated on grounds that they may also serve to promote other environmental values, such as open space and aesthetics, or may result in substantial losses in private property values.

Moving upward from the municipal level of government, we have already observed the advisory but influential role of the RPAs in passing upon the consistency of state and federally subsidized development proposals with regional plans. If an RPA has a fully articulated 208 plan--and better still, if it also has consistent plans pertaining to other components of the regional infrastructure--it may wield these review powers with convincing effect. It will remain for state and federal agencies that subsidize permits or undertake development projects to keep their activities consistent with the 208 and other regional plans.[46] Part of the problem to date has been the absence of coherent state and federal policies with respect to regional development, but the political trend of the times is to formulate such policies "from the ground up", largely on the basis of regional plans that have been--or hopefully will have been--articulated through processes of interlocal cooperation. Federal and state governments could also do a better job of backing their laws and policies for environmental protection with a more reliable

flow of funds, not merely for treatment plants but for collection systems, technical assistance to planners and operators, land acquisitions for open space, and other programs in the field of environmental management.

Two further possibilities should be mentioned for wielding effective state power in aid of implementing the objectives of a 208 plan. First, as already noted, the DWPC is authorized to regulate by permits the discharge of any pollutant, whether from a point or a nonpoint source, into "waters of the commonwealth", including both ground and surface waters.[47] Such authority therefore extends to all septic tanks, landfills, dumps, and sources of run-off. If the regulatory system established under a 208 plan for these sources fails to function, DWPC could step in and do the job.

Secondly, under recent legislation, the Commissioner of Natural Resources (or his successor) may classify waters of the commonwealth as "scenic or recreational;" restrict their use accordingly; adopt "orders regulating, restricting or prohibiting...[the] altering or polluting" of those waters; and include within the protected classification not merely the stream itself, but "such contiguous land not to exceed one hundred yards on either side of the natural bank...as the commissioner reasonably deems it necessary to protect by any such order."[48] These provisions authorize direct land-use regulation at the state level, and could be used to back up the regulatory programs to be established under section 208.

f. Conclusions

We make no claim to completeness in the foregoing discussion. It should be sufficient, however, to indicate the real possibilities of implementing the recommendations of the MWM Study through existing institutional arrangements. These could be strengthened by relatively minor changes at numerous points, but that is a subject that would require still more detailed analysis and discussion without altering our basic conclusion.

Whether the study's recommendations are likely to be implemented through institutions functioning more or less as they now do, is of course another question. As noted toward the beginning of this chapter, substantial resources will have to be brought to bear: enlightened leadership under public pressure to perform; adequate budgets, expertise, and manpower; above all, the political will to bring about the desired results. With these resources in tow, even a flawed set of institutions can perform impressively; without them, no set of institutions, however perfect they may seem on paper, will succeed.

2. Implementing the Recommended Plans: Particular Engineering Solutions

It remains to supplement the foregoing general discussion with brief comments, from an institutional perspective, on particular aspects of the plans for regional wastewater management recommended by the MWM Study.

a. The GLSD Area (MVPC)

The recommendation is to add advanced treatment onto the secondary plant prescribed by the current implementation plan. The GLSD, which will build and operate the secondary facility, is also the logical choice of management agency for the tertiary phase. Institutional complications are avoided, moreover, by preserving the GLSD as a separate, self-contained entity. However, the formulae for apportionment of capital and operating costs in the GLSD statute[49] will have to be amended to bring them into line with federal requirements (refer back to section 2.1.3) As it now stands, the statute apportions O&M costs among the four member municipalities "on the basis of the metered flow of sewage contributed by each..." This should be changed to take account of the strength as well as the volume of wastes, both domestic and industrial, contributed by each municipality, with further provisions enabling industrial cost-recovery and substituting user charges for property taxes as the means of allocating O&M costs among ultimate users within the respective municipalities. Failute to make the necessary changes in the statute would render GLSD ineligible for further federal construction grants.

b. The Haverhill Group (MVPC)

The recommendation is to add AWT onto the secondary plant prescribed by the current implementation plan. Haverhill and Groveland either have or shortly will have a service contract for treatment of the latter's waste in the former's facility. Provision should be included in this contract requiring, inter alia, that Groveland administer the implementation of applicable pretreatment standards by its industrial users, who account for 27% of the town's total waste flow by volume. Haverhill should do the same with respect to its industrial users. We observe at this point the desirability of including such provisions in all intermunicipal contracts for wastewater treatment, as well as provisions for allocating and assessing expenses in the proportions required by federal law.

Under the recommended plan, Haverhill would design its transmission lines to accommodate Boxford and Georgetown at some future time. There is no way of charging the two towns for this accommodation in advance of its use, but when and if they are taken into Haverhill's system, the city could charge them connection fees to recoup the costs

it will have borne on their behalf. The Haverhill-Groveland contract would be amended at that time to reallocate cost shares and other obligations among the four municipalities. If the addition of Boxford and Georgetown brings the Haverhill plant to full capacity sooner than expected, its discharge permit may have to be amended or reissued to provide for the planning and construction of new capacity before overload occurs.

Boxford and Georgetown could avoid having to build sewers and connect them to the Haverhill system, if they would implement effective land-use controls, especially with respect to the location and operation of septic tanks. Rigorous local enforcement of the State Sanitary Code, supplemented by other measures to control pollution from both point and nonpoint sources, could postpone indefinitely any need to construct separate wastewater treatment facilities for these towns, or to bring them into Haverhill's facility.

Boxford is presently outside the contemplated 208 area, but may yet be brought into it, and even if it is not, the town could still avail itself of its membership in the MVPC to participate in regional planning for wastewater management.

c. The Amesbury Group (MVPC)

The recommendation is to keep the secondary plant at Amesbury, add sand-filter beds at the site, and then pipe the resulting effluent to local land disposal sites. One of these is reportedly owned by a farmer who would be willing to sell it for the contemplated purpose, lease it back, and grow crops upon it for animal consumption. Another proposed site is owned by the Town of Merrimack. But at present, there may be some doubt whether DWPC would approve these proposals for spray irrigation and rapid infiltration. Moreover, the DPH-DEH generally opposes such techniques for disposal of municipal wastes. A demonstration project should perhaps be mounted soon, in an effort to persuade the state agencies to accept the recommended strategy. It cannot be implemented if they disapprove it. Local sentiment toward a rapid infiltration site in Amesbury should also be gauged in the 208 planning process.

Since Amesbury already has a treatment plant and will contribute substantially larger flows than Merrimack and West Newbury, an intermunicipal contract would be an appropriate vehicle for coordinating wastewater management among these three towns.

d. The Coastal Towns (MVPC)

Newburyport would upgrade its primary treatment plant to AWT and take in Newbury. Since the former already has a facility and will account for most of the flow from the two towns, it should contract with Newbury to treat the latter's waste.

Salisbury would add rapid sand filters at the site of its secondary plant and go to rapid infiltration, without the involvement of any other municipality. Such one-town solutions present the fewest institutional complexities.

e. The Pepperell Group (NMAC)

Addition of rapid sand filters to a secondary plant at Pepperell, followed by rapid infiltration, is deemed to be best practicable treatment. Pepperell would contract with Dunstable to treat relatively small flows from the latter.

The site proposed for rapid infiltration in Pepperell is presently zoned industrial and the town reportedly would like to preserve it as an ideal site for an industrial park. It will have to be rezoned and a different site found for the industrial park, if the study's recommendation is to be followed. Dunstable could perhaps assist Pepperell by sharing a portion of any extra costs incurred or benefits foregone by such a shift in plans.

These two towns are not yet included in any proposed 208 area. They may yet be included, however, in either the one to the East centering on Lowell or the one to the West in the Nashua River Basin. But even if left out of both 208 areas, planning for the two towns, which are members of NMAC, can go forward concurrently with 208 planning. This is one of several instances in which 208 funds should perhaps be supplemented by a state planning grant, so that the RPA can plan for its entire area.

f. The Chelmsford Group

It is proposed that an advanced waste treatment plant be constructed at North Chelmsford, serving Chelmsford, Westford, Tyngsborough and East Dunstable. The four towns should seriously consider forming a district among themselves to build and operate these facilities.

We do not know whether EPA has changed its earlier opinion that Lowell should treat at least a portion of Chelmsford's wastes and that the latter should not be awarded a construction grant to build its own separate treatment works. Perhaps the findings and proposals of the MWM Study will induce EPA to change its mind.

Only some parts of Westford now have problems with sewage, but the transmission line would be sized to accommodate the entire town, if necessary, at some future date. Effective local land-use controls might enable most of the town to remain on-lot indefinitely.

g. The Lowell Group

Reportedly, Lowell is still trying to negotiate a service contract with Dracut to treat the latter's wastes. Negotiations have been slowed by DWPC's disapproval of the plant design submitted by Lowell, on grounds that it failed to provide sufficient capacity to treat stormwater

and some other municipal flows. When questions of capacity and cost-sharing are resolved, the contract can be concluded. Lowell should also contract with Tewksbury and Tyngsborough to treat a portion of their flows, as recommended by the study. Whether a single trilateral contract would be preferable to three separate contracts will depend on whether the parties perceive significant interdependencies among their respective interests in this subregional wastewater management scheme.

h. The Billerica Group

The proposal is to upgrade the present facility at Billerica to AWT, serving Billerica and a portion of Chelmsford. An intermunicipal service contract would be appropriate.

FOOTNOTES

[1]The basin plan, in brief, will supply the technical basis for wastewater management planning; include priorities and target dates for abatement of all identified sources of pollution; discuss alternative strategies for water quality management and recommend particular strategies for more detailed consideration at later phases of the planning process; and estimate costs of needed control measures. The basin plan will also set forth programs for water quality monitoring, sludge disposal and intergovernmental cooperation in all phases of basin management. See section 303(e) of the Federal Act, 40 C.F.R. Parts 130 and 131, and the Taunton River Basin Plan prepared by DWPC (July, 1973, Pub. No. 689). Outstanding discharge permits and approved 208 plans will be included in the basin plan. The extent to which basin plans will serve as the cutting edge of wastewater management planning is unclear.

[2]See section 204(a)(2) of the Federal Act and Section 27(10) of the MCWA.

[3]See 40 C.F.R. 126.10.

[4]A matching grant from EPA under section 102(c)(1) of the Federal Act is one possibility that should be explored. The state and the involved municipalities might also share the planning expense if appropriations for this purpose could be obtained. If the RPA is thus enabled to plan simultaneously for its entire region, not only will serious gaps in planning be avoided, but difficulties will be avoided in determining whether members of the RPA that are excluded from the 208 area should nonetheless participate in planning for it and in voting on the 208 plan.

[5]Quoted from the form of the resolution of intent to be voted upon by the respective cities and towns included within the proposed 208 area. See 40 C.F.R. 126.10(c)(2).

[6]See section 208(a)(6) of the Federal Act.

[7]Set forth in 40 C.F.R. Pt. 126.

[8]Section 208(b)(1).

[9]Section 208(d) and (e) of the Federal Act; Section 27(10) of the MCWA.

[10]40 C.F.R. 126.11(a).

[11]Authority for such contracts is given by M.G.L. ch. 40 section 4A. Authority for the formation of intermunicipal districts is discussed in the text.

[12]Ch. 1074 of the Acts of 1973.

[13]Sections 307 and 402(b)(1)(A) of the Federal Act and 40 C.F.R. 124.45(e).

[14]M.G.L. ch. 83 and MCWA sections 32, 36 and 43(8).

[15]Section 202(a) of the Federal Act. Costs of land-oriented treatment works are as eligible as water-oriented ones, and sewer systems, with some exceptions, are as eligible in theory as treatment plants. Federal and state priorities for the use of limited funds, however, make it unlikely that many grants will be available for extending collection systems. Their cost may have to be born almost entirely by the municipalities that build them.

[16]MCWA section 33.

[17]Section 204(b)(1)(A) of the Federal Act.

[18]Id., 204(b)(1)(B).

[19]Under sections 30A, 32 and 36 of the MCWA, municipalities are authorized to adopt and administer the necessary charge systems. They should further be incorporated into the terms of intermunicipal contracts and special districts for wastewater treatment.

[20]See 40 C.F.R. 124.45(d).

[21]MCWA section 43(8).

[22]Section 204(b)(3) of the Federal Act.

[23]At present, the NPDES program under section 402 of the Federal Act is being jointly administered by EPA and DWPC, through issuance of combined federal-state permits to all dischargers. The state may yet qualify to take over administration of this program from EPA under section 402(b).

[24]The discharge permit program of the state under MCWA Section 43, unlike that under section 402 of the Federal Act, can be used to protect groundwater and to regulate nonpoint discharges to either ground or surface waters. Ground waters are included within the definition of "waters of the commonwealth" in section 26A. As a practical matter, however, coverage of non-point sources will depend on increases in DWPC's budget and staff.

[25]Section 309 of the Federal Act and sections 42-46 of the MCWA.

[26]Section 208(b)(2)(c)(ii).

[27]By the terms of 208(b)(1), 208 plans must be applicable to "all" wastes generated within the area. Section 208(b)(1) also requires 208 planning to be consistent with section 201, which requires control or treatment, to the extent practicable, "of all point and nonpoint sources of pollution". (Section 201(c)).

[28]Golden v. Plannning Board of the Town of Ramapo, 30 N.Y.2d 359, 334 N.Y.S.2d138, 285 N.E.2d291(1972). The analysis of the case in the text has been taken, with several editorial changes, from the author's work for the Water Resources Task Force of the Hudson Basin Project, sponsored by the Rockefeller Foundation through Mid-Hudson Pattern for Progress, Inc.

[29]Regulation 2.5 of Article 11 of the State Sanitary Code provides that "[n]o building or plumbing permit shall be issued until a Sewer Entrance Permit or Disposal Works Construction Permit has first been obtained". The sequence here prescribed, however, has frequently been ignored. M.G.L. ch. 111, section 127 authorizes local boards of health to make and enforce regulations relative to connection with common sewers.

[30]The Massachusetts Zoning Enabling Act, M.G.L. ch. 40A, authorizes municipalities by zoning ordinances or by-laws to "regulate and restrict the height, number of stories and size of buildings and structures, the size and width of lots, the percentage of lot that may be occupied, the size of yards, courts and other open spaces, the

density of population, and the location and use of buildings, structures and land for trade, industry, agriculture, residence, or other purposes".

Traditional zoning has fallen into some disrepute as a tool of planning and environmental protection, having been largely undermined by misuse of the variance-granting power, but its potentialities for protecting water quality are obvious. For example, large-lot zoning can be used when percolation tests reveal poor soils unable to support high-density on-site septic systems, or when a community desires thereby to avoid overcrowding, to facilitate the provision of municipal services, to secure recreational space, or to encourage cultivation of vegetation. See Simon v. Town of Needham, 311 Mass. 560. Zoning may not be used, however, for exclusionary purposes, not may it--or any other form of land use control--go so far as to deprive an owner of all reasonable use of his land without compensating him for a taking.

[31] The Subdivision Control Law, M.G.L. ch. 41, enables communities to regulate the laying out and construction of ways in subdivisions so as to ensure sanitary conditions, proper drainage, and adequate provision for open space. This law could be made more effective if planning boards charged with administering it included more technically qualified members. (Similar deficiencies have been noted with reference to the responsibilities of local boards of health).

[32] M.G.L. ch. 40A, section 2, discussed further below in connection with the Turnpike Realty case. Floodplain zoning protects water quality, as a secondary objective by preserving land in its natural riparian state.

[33] These techniques, which are ordinarily administered by special permits from local zoning boards, allow variations in density of development on a given parcel of land so as to preserve some portion of it as natural or open space. Permeable natural surfaces are thereby continued in being, in part for the protection of water quality, and costs of sewering are reduced. Such techniques are available, however, only in sewered areas.

[34] This technique requires the applicant developer to submit an environmental impact statement to the municipality describing how his proposed development will affect the physical environment, including

effects on ground and surface waters. In reviewing such a statement, the permitting board may consider the degree to which water would be recycled back into the ground; maintenance and improvement of the flow and quality of surface waters; preservation or promotion of natural areas; and impact on the growth rate, infrastructure, and fiscal capability of the community. However, this approach calls for a sophisticated level of information that many communities may be unable to achieve without incurring unacceptably high costs. Several communities have nonetheless adopted impact zoning, including Duxbury and Lincoln. A program of technical and financial assistance from the state would be a means of enabling other communities to institute this kind of control (see Chapter 5).

[35] M.G.L. ch. 131, section 40, as amended in 1974. Under this law, local conservation commissions or other agencies hold public hearings on proposals to alter wetlands, and may impose such conditions on a proposed development as are deemed necessary to protect water supply or to prevent pollution. On appeal to DNR, however, local orders for wetland protection may be overruled or modified. The efficacy of this law therefore depends in large measure on the degree to which the state backs up the local agency.

[36] See the discussion below of the Turnpike Realty case.

[37] For example, requirements for vegetative cover, catch-basins and other drainage controls, buffer zones and the like. See Kelleher v. Board of Selectmen of Pembroke, 294 N.E. 2d 512 (1973). For rural areas, there are two relevant federal programs: (1) the Soil Conservation Service of the U.S. Department of Agriculture provides P.L. 46 program assistance to farmers, in cooperation with soil conservation districts established under state law, to control erosion and sedimentation through proper soil-conserving practices; (2) under the Rural Development Act of 1972, P.L. 92-419, 86 Stat. 657 (8-30-72), the Secretary of Agriculture is authorized to assist farmers and communities in installing erosion and nutrient run-off controls.

[38] See United Reis Homes v. Planning Board of Natick, 359 Mass. 621 (1971).

[39] See Dugout, Inc. v. Board of Appeals of Canton, 1970 Adv. Sheets 201.

[40]However, local boards of health often lack the necessary expertise and resources to exercise these responsibilities effectively, and the State DPH--Division of Environmental Health lacks the necessary resources to monitor local performance. It is widely agreed, furthermore, that water quality would be better protected if applicable regulations were stiffened to control drainage from subdivisions and to require slower percolation rates for soils under septic tanks.

[41]The principal sources are the Land and Water Conservation Fund, administered by the Bureau of Outdoor Recreation in the U.S. Department of the Interior, and the Massachusetts Self-Help Program established under M.G.L. ch. 132A, section 2, and administered by the Division of Conservation Services in the Office of Environmental Affairs. Funding for these programs, however, has been at levels far less than the legitimate demands placed upon them.

[42]A conservation restriction is an agreement by which a property owner promises a governmental or private agency to restrict development of his land. Such restrictions may be purchased or granted by gift, and may range from outright purchase of development rights to simple easements. Future grantees will take the land subject to the same restrictions. They will often qualify the owner, who retains title to the land, to certain tax advantages. See ch. 719 of the Acts of 1972; M.G.L. ch. 40, section 12.01. Any restrictions necessitating a capital expenditure must be approved by a two-thirds vote of a city council or town meeting, and by DNR.

[43]M.G.L. ch. 61, 61A.

[44]The entire subject of economic incentives in land-use management needs to be explored further with reference to the study area. Such techniques might include transferable development rights, special assessments, development bonuses, and various forms of state or municipal assistance.

[45]1972 AS 1303, 284 N.E. 2d 891 (1972).

[46]In response to public pressures, DPW was recently persuaded to locate a portion of Route I-190 farther from the Nashua River than originally planned, and to propose siltation pools for controlling polluted run-off. See the 1974 Annual Report of the Nashua River Watershed Association, at p. 3. Sensitivity to such environmental values on the part of the state should not, however, have to depend on ad hoc citizen pressures, but should be a matter of standard operating procedure.

[47]Sections 26A and 43(2) of the MCWA.

[48]M.G.L. ch. 21, section 17B.

[49]Ch. 750 of the Acts of 1968, as amended.

C. CRITERIA FOR AREAWIDE WATER QUALITY MANAGEMENT INSTITUTIONS

1. The Criteria Problem

The previous chapter arrived at a pragmatic judgement that, given the fairly conservative, decentralized nature of the preferred engineering solution, existing institutional arrangements for water quality management could be made to work to successfully implement PL92-500 in the Merrimack basin. This judgment is clearly a conditional one. It assumes that certain important deficiencies in the areas of planning, O&M and related land use controls can be overcome without making major institutional changes, and that existing legislation and regulatory authority will be fully exercised. The next three chapters of this study will deal more explicitly with future alternatives to the existing set of institutional arrangements, should current problems and deficiencies prove sufficiently intractable as to undermine the ultimate achievement of the water quality goals of the Act.

This chapter takes up the so-called "criteria" problem, that is, the normative question of what ought to be the characteristics of that set of institutional arrangements best equipped to meet water quality management challenges of the mid-1980's. The discussion will focus primarily on the innovative areawide planning and management requirements of Section 208 of the federal legislation. The basic approach taken is to review the current literature on areawide quality management and use it to formulate institutional design criteria helpful for assessing the strengths and weaknesses of a number of possible future areawide arrangements. Chapter D will then apply these criteria, wherever possible, to three general classes of institutional alternatives open to the mid-1980's: interstate, statewide, and sub-state regional. Chapter E subsequently pulls together features of several of these alternatives and lays out a general institutional framework which could serve future planning and management needs if, and when, present arrangements prove inadequate. Included is a discussion of how transition from what we have now to what eventually may be needed could be accomplished.

A number of preliminary observations are in order before launching into the discussion of the individual institutional criteria. First, the existing literature relevant to the criteria problem is disappointingly thin, oriented more to water supply than specifically to water quality management. The discussion here draws most heavily on five recent studies dealing with various aspects of institutional arrangements for water pollution control.[1] For the most part, the criteria have not been rigorously formulated and are surrounded by numerous caveats and counter-arguments. The criteria themselves are not internally consistent, reflecting as they do conflicting value systems (e.g., economic rationality pointing toward larger, more centralized management agencies, the desire for political responsiveness and accountability resisting this push). These problems are to be

expected and while they do not negate the value of the normative exercise they do place limits on the direct, uniform applicability of its results. The single unifying conclusion in the literature is that of the overriding importance of local circumstances in determining the desired structure of water quality management institutions.[2]

The criteria to be discussed here relate to basic choices regarding organization design, not to performance standards as to how to best carry out individual water quality management functions such as planning, design, construction, etc. Choices have to be made concerning:

- the number of institutions to be involved
- their geographic/jurisdictional scope
- the range of services to be coordinated
- the allocation of functions between and among levels of government
- the extent of public accountability/accessibility

Choices made in one or all of these areas will affect the manner in which individual functions are performed, but do not in themselves entail function-specific criteria. The basis for choice among future institutional/financial alternatives to be outlined in Chapter D will include not only an assessment of their consequences for effective performance of individual management functions, but also their implications for other forces at work in a policy system such as local preferences, existing state plans, and the likelihood of legislative enactment.

The institutional criteria are presented, mainly for analytic convenience, under three major headings--economic, administrative and political. The distinctions among them, however, are never quite this clear-cut. They are summarized in the chart which follows (see Figure 2). Subsequent sections of this chapter will discuss each of these three areas in turn.

2. Economic Criteria

Three principal criteria for organization design in the area of water quality management reflect a basic insistence on economically "rational" decision-making. All are derived from the economist's model of how choices concerning resource use are made in a decentralized decision-making system where markets are competitive and individual decision-makers act rationally to maximize private benefits.

FIGURE 2

INSTITUTIONAL/FINANCIAL CRITERIA

Economic	Administrative	Political
1. Internalize all significant externalities	1. Adequate legal and administrative authority	1. Compatability with existing governments
2. Achieve economies of scale	2. Adequate financial authority	2. Public accountability/ citizen participation
3. Impose efficient systems solutions	3. Technical/Managerial competence	
	4. Functional separation	
	5. Coordination with related services	

In a competitive market, at the margin the price of a resource is equal to its opportunity cost, i.e., its contribution to the value of output in all alternative uses. Prices provide automatic, socially valid guidelines for investment and production and the result is an optimal allocation of resources. An important form of market failure occurs in the presence of technological external diseconomies, or "externalities". Externalities exist when what a consumer consumes or business firm uses in the way of inputs are not entirely within their control. Supply and demand as expressed in markets are no longer the only forces that govern consumption and production decisions. This situation can arise where a particular individual's actions lead to uneconomic results--higher costs, less valuable production, even foregone consumption or production opportunities--and the costs of the actions are not borne by that person but instead are passed on to other managerially independent units through technical or physical linkages between production processes. Water borne waste discharges provide an excellent example of externalities: a downstream water user, either a recreationist or a manufacturer, cannot control the quality of the water he receives as return flow from upstream users. To downstream users, dead fish or higher treatment costs for intake water are real costs but they are external to the waste discharger, and because he does not bear them he does not weigh them in his decisions.

The result of such a situation is a less than optimal allocation of resources. Where the upstream discharger can ignore off-site costs, he tends to overproduce what is an artificially "cheap" product. He will not design his internal processes to reduce the generation of wastes. He will use too much of certain inputs which have particularly large external costs, and he will not treat his effluents, even though doing so might involve lower costs than are imposed on downstream users. The higher costs imposed on these downstream users distort their production (and consumer utility) functions, again leading to a failure of the unaided market to produce maximum economic welfare.

Where such distortions resulting from externalities are particularly harmful, as is the case with water pollution, economists use them as the basis for justifying public intervention to equate marginal social costs and benefits. The form of collective action prescribed is public provision of treatment services where treatment costs are equitably borne by all dischargers. The economic logic underpinning such a solution is to centralize responsibility for waste treatment to the point where all major dischargers are comprehended within the jurisdiction of the treatment agency so that all external costs are effectively internalized. Where the technological processes available for correcting the effects of externalities are themselves characterized by significant economies of scale, as is again the case with water pollution, the case for centralized administration action over a wide geographic area is further strengthened. Finally, a growing body of

technical literature exists to document that it is more economical to achieve any given level of stream quality if water control is undertaken in an integrated manner throughout an entire river basin,[3] Given that significant externalities exist, utilization of any single treatment technique at any individual location in the basic area will have an impact in terms of cost and water quality at many other locations. Unified planning can respond to variations along the river in the cost and value of treatment. The optional combination of waste treatment facilities and levels of treatment at various sites can be selected. Optimal in this context means the most "efficient" solution, i.e., achievement of water quality objectives at the lowest cost.

Thus, three criteria relating to the geographic/jurisdictional scope of water quality management institutions emerge from the competitive market model of the economist. First, to internalize all significant externalities, second, in the process achieve economies of scale, and third, as a result have the capability to impose efficient system solutions.

Criterion #1: Internalize All Significant Externalities

This criterion deals mainly with the extent of geographic coverage of a water quality management entity. The test of sufficient coverage is whether all major sources of waste discharge affecting a basin (or sub-basin) area are included within the agency's geographic area of responsibility. Only then will any system of charges established have the desired effect of regulating and modifying water dischargers' economic behavior. Clearly some outer geographic limits must be set, and control over remaining external waste dischargers maintained by setting and enforcing water quality standards at points of confluence.

A related political argument calls for including sufficient geographical jurisdiction to effect political control over the total area containing both the sources and results of water pollution. This variant, by focusing on inclusion of the relevant governmental units rather than solely the locations of specific dischargers and affected water users, leads to potentially wider areas of geographic inclusiveness than does the strictly economic criterion. It may mean the inclusion of more territory than economic considerations would dictate, but with a consequent gain in the ability of the institution to exert political leverage for implementing its decisions.

Criteria #2: Achieve Economies of Scale

This criterion deals jointly with the scope of geographic coverage of a water quality management institution and the associated population density. Given a population density of sufficient size[5] it generally follows that the wider the geographic scope of the agency the lower will be the per unit costs of the services it provides. For

one thing there are substantial economies of scale in the construction and operation of individual waste treatment plants. Therefore, if plants are to be of optimal size, it is likely that wastes from a number of municipalities will have to be combined. A wider geographic area brings with it a broader tax base, greater ability to attract and retain competent personnel, and stronger incentives to employ the most advanced technology. A multi-plant regional agency will also gain increased efficiency from centralized overhead functions such as planning, budgeting, purchasing and laboratory and research services.

Criterion #3: Impose Efficient System Solutions

The effect of any given amount of waste on a stream depends on the condition of the stream, in turn depending on when and where the wastes are dumped and on what other waste is also present. As the effects of added wastes vary, so does the value of waste control. The value of each plant (or other treatment means) depends upon what other treatment facilities are also in place. The preferred institutional arrangement should allow the relevant treatment agency the necessary geographic/jurisdictional scope to consider the cost and quality implications of all treatment techniques and to select the most efficient combination of these, in terms of achieving desired water quality standards at the least cost. Clearly this criterion implies more than just a regional jurisdictional perspective. It suggests that the preferred agency have the ability to implement a wide range of treatment modes, including not only standard treatement works but also in-stream aeration and low-flow augmentation.

3. Administrative Criteria

In this section five additional design criteria related principally to administrative structure and process will be introduced. The first three of these bear directly on the ability of a proposed institutional/financial alternative to carry on the basic functional responsibilities involved in wastewater management. They concern legal, financial and technical competence. The other two criteria involve allocation of functions and coordination of related services, respectively.

Criterion #4: Adequate Legal and Administrative Authority

Simply stated, this criterion holds that the proposed agency(s)' legal and administrative powers is commensurate with its functional responsibilities. Alternative institutional/financial arrangements will differ in the specific legal powers they require to carry out their associated responsibilities one or more agencies will require the following powers:[6]

- authority to develop and require implementation of a comprehensive plan for wastewater management;

- review and approval power of plans submitted by subordinate geographic units, based on conformance with the comprehensive plan;

- authority to issue both general obligation and revenue bonds;

- power to set charges or fees and to assess taxes to finance indebtedness;

- right of eminent domain;

- authority to construct and operate wastewater treatment facilities;

- right to hire consultants or to subcontract to other governmental or non-governmental entities;

- authority to set standards, investigate alleged non-compliance, hold hearings and seek judicial redress.

Again, the allocation of these powers among agencies will differ across institutional/financial alternatives. In some instances they may reside in a single agency, in others they may be split among a number of agencies.

Standard criteria for effective administrative structure should also be met. These include unity of command, a heirarchical structure of authority, appropriate span of control, and the ability to shift resources and personnel within and between functional and service areas.

Finally, a premium should be placed on administrative flexibility, particularly the ability to adapt to changing demands and requirements. As Bower and Kneese have stressed:

> "The job is not simply to 'clean up' the nation's waters; rather it is to manage continuously the quality of these waters over time in the dynamic context of a growing and affluent urban-industrial society."[7]

Any proposed institutional arrangement should possess genuine flexibility in all its relevant dimensions--functional, service, area. This means authority to accept new functions or services if no agency exists to administer them or if subordinate units of government are not adequately meeting their responsibilities. It also means reasonable latitude in devolving certain functions and services to subordinate units

when circumstances dictate, even divesting itself of these altogether when they are no longer needed or appropriate. When the geographic scope of the problem changes, as with urban expansion into surrounding areas, the service boundaries should likewise be able to be changed to keep pace with development.

Criterion #5: Adequate Financial Authority

As mentioned previously the wastewater management agency should have legal authority to issue both general obligation and revenue bonds, and the ability to amortize the indebtedness through assessments on municipal property tax revenues and imposition of user charges. Whether the agency should have the power to levy taxes will likely depend on the method of selection of its policy-making board. If the board were composed primarily of elected representatives, there would be no question of its right to possess taxing powers. However, if the board were instead made up of representatives of the agency's constitutent governmental units, then its power to tax (and incur indebtedness) without direct voter approval would be questionable since it would constitute "taxation without representation". But under no circumstances should the management agency be dependent for its debt service and/or operating budgets upon the voluntary contributions of its constituent governmental units.

Criterion #6: Technical/Managerial Competence

Advanced treatment facilities, as well as the more nearly regional systems they will necessarily be a part of, will require the highest calibre of technical and managerial personnel to run them. A preferred institutional arrangements should at a minimum:

- provide for competitive wage and salary scales, in order to attract well-trained, competent staff;
- protect technical and managerial positions against patronage appointments, to insure agency professionalism;
- build-in strict monitoring procedures and other safeguards against improper operation and maintenance practices

Clearly, these requirements imply a bias toward a more centralized, regional structure able to command the necessary resources and professional attitudes.

Criterion #7: Functional Separation

The basic wastewater management functions to be performed under any proposed institutional arrangement consist of planning, design,

construction, finance, operation and maintenance, monitoring and enforcement. Administratively, it is not necessary that all these functions be performed by the same agency or at the same level of government. Both the provisions of PL92-500 and the existing literature[10] support the proposition that standards-setting and enforcement, i.e., the regulatory functions, should be kept organizationally separate from the other wastewater functions. This is an administrative prescription, but one taken largely on political and equity grounds: the need for a rule-making entity universally regarded as fair and judicious, and subject to pressures from all interests affected, public and private.

A second standard put forward tentatively here is the further organizational separation of planning from the remaining functions (design, construction, finance, O&M). This is essentially a planning-operations distinction, based in turn on a differentiation between political and technical tasks. Planning necessarily involves the establishment of goals and objectives somehow reflective of popular values and consistent with democratic process. And as will be argued in the following section, it is also the forum within which trade-offs must be negotiated regarding other services related to water quality. Ultimately then, planning decisions are made on political rather than technical grounds. The operations functions are more clearly those suited to technical decision-making. To the extent political and technical values come into conflict in water quality management, this criterion implies the institutionalization of value conflict. To the extent that an operations agency will tend to identify its interests with those of the industrial and municipal dischargers it serves, this tendency toward institutionalization of conflict is heightened. Again, as with the separating off of regulatory functions, this organizational distinction rests at bottom on an equity concern, equalizing group access to the decision-making process.

Criterion #8: Coordination with Related Services

A number of important physical and economic inter-dependencies exist between wastewater management and other areas of public concern. The administrative correlate of the economic concern for the recognition of externalities and the achievement of efficient "systems" solutions is the desirability of managerial coordination (if not direct integration) of wastewater-related public services. An important criterion to be applied to all proposed institutional/financial alternatives then is the extent to which they make explicit provision for administrative connections between wastewater management and these related services.

Particularly important for assessment purposes are evidence of planning and operational interface with the following service areas:

- flow management, that is all decisions affecting stream flow (dams, navigational structures, diversion systems, flood control facilities);
- water supply, including all withdrawals, inter-basin transfers and water wholesaling functions;
- land use planning, especially the spatial location of economic activity;
- non-point source regulation, including enforcement of local sanitary codes, stormwater management, and controls over urban and agricultural run-off;
- solid waste management, particularly the possibility of joint facilities;
- fishery management and water-related recreation;
- power, transportation.

This criterion does not specify the form these service "connections" should assume, but merely that there be evidence that they are provided for. It posits as a good any such evidence. In many cases the connections may not be direct administrative integration.[11] Rather, it may have to come in the form of various coordinating mechanisms such as inter-agency committees and legislative specifications of planning process criteria (e.g., the requirement that the Corps and the Bureau of Reclamation take pollution control benefits into account when estimating the value of multi-purpose dams).

4. Political Criteria

In this final section two more criteria are introduced, mainly dealing with factors influencing the political acceptability of any given proposed institutional/financial alternative. The two groups whose concerns they address are, respectively, existing local governments and the lay public.

Criterion #9: Compatability with Existing Governments

No proposed institutional/financial arrangements should involve duplication of any service or functions currently being performed adequately by existing governmental units. Furthermore, whatever existing local efforts are inadequate and a region-wide solution required, a conscious attempt should be made to devise mech-

anisms for sharing power with the local government units rather than simply expropriating it. This requires in each case a careful assessment of which functional or service aspects can be left in local hands and attention to the political benefits of doing so (e.g., partial satisfaction at least of the citizen's desire for quality services and responsive government). The upshot of this criterion then is a deliberate fostering of a two-tier government structure where most powers are shared powers, reflecting a series of compromises between efficient service delivery and the citizenry's sense of control over the quality and quantity of the services they receive.

Criterion #10: Public Accountability/Citizen Participation

This last criterion deals directly with the democratic values of representativeness and citizen involvement in governmental processes. It focuses on two particular elements of any proposed institutional/financial arrangement: the method of selection of an agency's policy-making board, and the specific mechanisms of citizen participation in the agency's decision-making system.

An elected board is preferable on grounds of representativeness, but essentially only if the agency is to have taxing powers. A board made up of representatives of the agency's constituent governmental units would be more consistent with the two-tier approach to area-wide government (refer back to Criterion #9) but this fact may simply point to a divergence of natural interest between the local units and the general public. A compromise is possible which combines popularly elected and locally appointed representatives in some nearly equal proportions. Again, elections can be held at-large or by district, with the former favoring development of a regional perspective and the latter reinforcing the sense of small-unit autonomy.

To insure effective citizen participation, a proposed alternative should include specific structural mechanisms to enable the public to present its views at all important points in the agency's decision-making process. Hughes cites four such mechanisms in his recent environmental management study for the metropolitan Washington, D.C. area:[12]

- outreach efforts for obtaining and redressing legitimate public complaints about service;
- advocacy planners available to assist groups of interested laymen;
- formal public hearings at the points of site selection and preliminary design;

- continuous public representation on the agency's governing board, either elected, exofficio, or advisory.

A number of other such mechanisms would also seem to be appropriate and desirable. For instance, public hearings much earlier in the planning process are a necessity if interested citizens and private groups are to have input into the formulation and assessment of engineering alternatives as well as institutional arrangements. Also, public review and comment on draft versions of agency and consultant reports can be very effective in highlighting any issues which have been slighted or overlooked. Finally, citizens ought to have input into O&M, regulations and enforcement matters as well as planning if their watch-dog role is to be fully realized

FOOTNOTES

[1]Allen Kneese and Blair Bower, Managing Water Quality: Economics, Technology, Institutions, Johns Hopkins Press, 1968; Marc Roberts, "Organizing Water Pollution Control: The Scope and Structure of River Basin Authorities", Public Policy, Winter 1971; Paul Hughes, An Analysis of Alternative Institutional Arrangements for Implementing an Integrated Water Supply and Waste Management Program in the Washington Metropolitan Area, Institute for Defense Analyses, March 1971; David Ranney, Institutional Design for Water Quality Management: A Case Study of the Wisconsin River, Volume IX, Water Resources Center, University of Wisconsin, 1971; Robert Dorfman, et. al., Models for Managing Regional Water Quality, Harvard University Press, 1973.

[2]Roberts, op. cit., p. 114.

[3]Edwin Johnson, "A Study in the Economics of Water Quality Management", Water Resources Research, III (No. 2, 1967); Robert K. Davis, "Planning A Water Quality Management System: The Case of the Potomac Estuary", in Kneese and Smith (eds.), Water Research (Baltimore: published for Resources for the Future, Inc., by the Johns Hopkins Press, 1966); K. D. Kerri, "An Economic Approach to Water Quality Control", Journal of the Water Pollution Control Federation (December 1966), and E. Smith and A. Morris, "Systems Analysis for Optimal Water Quality Management", ibid. (1969).

[4]See Hughes, op. cit., pp. 88-89.

[5]See Lawrence Susskind et. al., "Economies of Scale: Criteria for Sub-State Regionalization in Massachusetts, MIT, 1971, p. 54. This paper provides an estimate of 50,000 population as the optimal level for provision of regional waste treatment services.

[6]See Hughes, op. cit., pp. 89-90.

[7]Kneese and Bower, op. cit., p. 301.

[8]On these points, see Roberts, op. cit., pp. 122-133.

[9] op. cit., Ch. 6, p. 4.

[10]On this point see Roberts, op. cit., pp. 132-133; Ranney, op. cit., Ch. VI passim; Hughes, op. cit., p. 90.

[11]See Roberts, op. cit., pp. 113-122.

[12]Hughes, op. cit., pp. 98-99.

D. ALTERNATIVE FUTURE INSTITUTIONAL ARRANGEMENTS

1. Assessment Problems

The purpose of this chapter is to put forward for consideration three general classes of institutional/financial arrangements which potentially represent options for water quality management in the Merrimack basin by the mid-1980's. The extent to which any of these options will actually be needed will depend, in turn, on the success with which the existing institutional arrangements deal with the critical problems of areawide planning, management and water-related land use control. The burden of the argument in Chapter B was that the existing institutions, modified as recommended, could meet these patterns and that no major organizational changes would be required. However, should this judgement not be borne out by future developments and a more thorough-going restructuring be necessary, then it is simple prudence to have a clear idea in mind ahead of time as to what the real institutional choices are and what the problems of implementing them will be.

The three alternative institutional frameworks, suggested originally in the contractual scope of services and then developed, are structured largely along geo-political levels. The three options are, respectively:

- Interstate;
- Statewide;
- Sub-state regional

In each case, these geo-political arrangements are assessed in terms of the entire range of water quality management functions, i.e., planning, finance, construction,O&M, monitoring and enforcement. To the extent the alternatives are also discussed in terms of water-related services, the focus is almost exclusively on land use management and control.

It should be noted that the discussion in the following sections is heavily slanted toward more general "institutional" questions rather than specifically to the "financial" function. This is not to downgrade the importance of Criterion #5, adequate financial authority. It simply reflects the fact that between the relevant federal and state statutes there is little room for identifying really significant financial alternatives. With the exception of the non-industrial portion of the construction costs, the 1972 amendments to the FWPCA specify user charges as the required method of payment. The only real options for the non-industrial portion of construction costs are between user charges and the local tax base, and this isnot a sufficiently dramatic difference to require inclusion in the discussion of major institutional alternatives.

This last point raises a more general problem regarding the useful application of the institutional criteria developed in Chapter C from the existing economics and professional management literature. A number of these criteria simply do not lend themselves to rigorous comparative analysis of the available institutional options. Criterion #4 calls for adequate legal authority, which would be an obvious requirement for any proposed set of institutional arrangements, but this does not itself provide any useable distinctions among interstate, statewide and sub-state regional options. There would not appear to be any inherent obstacle to providing adequate authority to any of these three classes of institutional arrangements if the political will existed to do so. A related difficulty arises in applying all three of the economic criteria: internalizing externalities, realizing scale economies, and imposing efficient system solutions. Unless the proposed engineering solution were much more detailed as to costs and implementation schedule, it is not possible to determine whether an interstate, a statewide or a sub-state regional arrangement would be the most preferable from the standpoint of achieving these objectives. General arguments to the effect that the more geopolitically inclusive the institutional arrangement the more efficient the solutions it will come up with simply are not true independent of the engineering details of the specific basin situation. Finally, the criteria developed from the literature review tend to give short shrift to implementation problems. In looking at various institutional options in a specific geo-political context like the Merrimack basin, issues such as local autonomy, political acceptability and legislative feasibility immediately begin to assume great importance in any debate. These issues are only partially dealt with by Criterion #9 regarding compatability with existing governments.

All of this is to say that there are some very real limitations on the usefulness of the institutional design criteria drawn from the current professional literature when it comes to using them as tools for assessing the wide range of future institutional options which are open to the Merrimack basin. They certainly are not without value, but they are often difficult to apply. They <u>are</u> useful for helping structure the arguments concerning relative strengths and weaknesses of the various institutional options, but they cannot be made to mechanically yield a "best" option for a specific area basin.

The following sections of this chapter take up, in turn, the interstate, statewide and sub-state regional options for future water quality management arrangements. Wherever practicable they apply the institutional assessment criteria from Chapter C and reference them as such. Chapter E then will present Abt Associates' best judgment as to what future institutional arrangements may become necessary by the mid-1980's should existing institutions not prove flexible or effective enough to achieve the goals of the 1972 federal legislation. This "futures" option will draw on aspects of several of the types of arrangements to be discussed below, and represent a "hybrid" version best suited to the anticipated needs of the Merrimack River basin.

2. Interstate Options

On interstate rivers such as the Merrimack River, one possible option for future institutional/financial arrangements is a federal interstate compact agency modelled along the lines of the Delaware River Basin Commission. This section will first briefly summarize the general advantages and disadvantages of the federal interstate compact approach, drawing on the DRBC experience. Then it will assess the specific issues raised by interstate water quality arrangements on the Merrimack River itself.

The Delaware River Basin Commission was created in 1961, the first interstate compact for water resources management to include the federal government as a signatory party and fully participating member. Federal membership was intended to bring about that essential coordination of federal and non-federal water resource programs previously missing from purely interstate river basic compact arrangements. It reflected the recognition that a compact plan for an interstate river basin could not truly be comprehensive without encompassing federal water planning as an integral part of the effort, nor would the plan serve any useful function unless all interests in the basin, including the federal government, were consulted to carry out their respective programs in accordance with it.

The DRBC consists of the governors of the states of Pennsylvania, New Jersey, New York and Delaware, and the U.S. Secretary of Interior, its decisions taken by a simple majority vote. The bulk of the Commission's work is handled by official alternates, designated by its members, supported by a full-time professional staff. The Commission has a broad grant of authority to formulate a comprehensive plan for the development and use of the basin's waters, covering water supply, pollution control, flood protection, watershed management, recreation, hydro-electric power and withdrawals and diversions. Water quality control is the Commission's principal action program regularly accounting for over half its annual operating budget. Its specific powers in this area include the establishment of stream classifications, waste treatment standards and related treatment rules and regulations. The DRBC can design, construct, operate and maintain all facilities deemed "necessary, convenient or useful" to the purposes of the compact and finance them through issuance of general obligation and revenue bonds and collection of user charges. The Commission contracts with its member states to run a cooperative monitoring and surveillance system and can issue abatement orders enforceable in court.

Federal interstate arrangements like the DRBC possess certain distinct advantages in the area of water quality management, all largely traceable to their inclusive regional scope. The DRBC area of responsi-

bility includes the entire Delaware River basin, thus facilitating rational planning by enabling the Commission to address the pollution problem in its full hydrologic context. Referring back to the economic criteria discussed earlier in Chapter C, inclusive interstate arrangements greatly enhance the possibility of internalizing significant externalities in production and consumption, realizing scale economies in construction and O&M and imposing efficient basin-wide treatment solutions. (Criterion #1, 2 and 3). The DRBC also illustrates the advantages of geographic inclusiveness for multifunctional planning and programming. Given its wide regional scope the Commission can sensibly address related water and land resource management problems and gain the benefits of coordinated planning while being in a position to recognize and take account of necessary trade-offs among its various activities (Criterion #8). Larger scale also contributes to the ability of an interstate agency like the DRBC to attract and retain competent technical and administrative staff[1] (Criterion #6). Finally, the interstate dimension of regional inclusiveness permits the participation of the federal government in the entire process, bringing with it the gains from increased vertical coordination among levels of government. It also brings federal financial support; the federal government picks up 24% of the annual costs of the operation of the DRBC and its programs.

Interstate arrangements can also entail significant disadvantages and costs. Not the least of these is implementation delay due to the great difficulties involved in actually negotiating interstate agreements and securing the necessary administrative and legislative approvals. The Delaware River Basin compact took a full ten years from the initial proposal to final notification, the ORSANCO compact on the Ohio River took twelve years.[2] The agreements themselves can be extraordinarily complex, and various state and federal agencies jealously protective of their respective powers have tended to drag out the negotiations even further for bargaining advantage. The costs of such delay can be incalculable both in terms of bureaucratic time and effort and the opportunities foregone to begin dealing effectively with pollution problems.

The DRBC in action has tended to be conservative in exercising the powers given it under the compact and extremely deferential to the prerogatives of its member states. A recent evaluation of the DRBC urged the Commission to be more activist in the areas of standard enforcement, wetlands protection, preservation of national and historic sites, and water allocation as it affects the rate and location of future growth within the basin.[3] Also, although the Commission possesses a variety of financing authorities it has not really utilized them as yet. The member states have tended to retain an effective veto over proposed Commission actions affecting them, including the development of regional solutions to water pollution problems. To a certain extent this deference by the Commission simply reflects the provision in the compact agreement which states "the purpose of the regulatory parties to preserve and utilize the functions, powers and duties of existing offices and

agencies of government to the extent not inconsistent with the compact... and employ such offices and agencies for the purpose of this compact to the fullest extent it finds feasible and advantageous". But there is more to the issue than this. The DRBC lacks independent political support. There is no regional constituency which corresponds to its regional mandate: no regionally organized political parties, regional election, interest groups and other sources of public opinion that discipline and legitimate the politican's attempt to effectuate public policy as at the local, state and national levels.[4] In this political vacuum the power of the individual member states tends to dominate and constrain the actions of an interstate agency (Criterion #9). One of the serious consequences on the Delaware River has been a less than aggressive approach to water quality problems having region-wide signifiance.

Interstate agencies are generally more politically remote from the people than are those on the areawide or even the state level. Again there is no existing electoral framework to comprehend or discipline them, and thus the traditional mechanisms for public participation such as public information programs, citizen advisory committees and formal public hearings are even more removed than usual from the avenues of effective citizen power (Criterion #10). This drawback is particularly important in states like Massachusetts and New Hampshire where home rule is so strong and even RPA-level agencies can be seen as distant and alien from local concerns.

On the Merrimack an interstate river basin authority is simply not a feasible system politically. The case for an interstate agency is essentially the abstract one of economic efficiency-multi-functionalism-intergovernmental coordination. The relative weight of these values in the political equation can be inferred from New Hampshire's decision not to participate in the Corps of Engineers' study. New Hampshire has evidenced a strong intention to do its own planning on the Merrimack, to go its own way independent of Massachusetts and federal input. Even if an interstate compact were to be negotiated, the tendency for member states to exercise near-veto power over Commission decisions would likely ensure that New Hampshire and Massachusetts would both move to severely limit that agency's operating authority. The sentiments expressed by citizens at public meetings held in the basic showed a strong <u>local</u> orientation on issues, and the remoteness of an interstate entity also just seems to much in conflict with what the people seem to be willing to accept in the way of amended institutional arrangements. This set of arguments holds regardless of whether the interstate option being considered is on the Merrimack alone or for the combined Merrimack-Nashua basin.

The counter-argument that New Hampshire has tolerated, indeed actively participated in, an interstate arrangement on the Nashua (the Nashua River Program) is not persuasive as an indicator that an interstate basic authority might be potentially acceptable. The NRP is seen as a program, not an agency. It is a demonstration program which brings in federal money without federal control or the creation of a competing agency structure. The NRP is tolerated because it is not seen as a threat to existing institutions. A river basin authority modelled along the lines of the DRBC would not be seen in this same light.

3. Statewide Approaches

Another set of institutional options involves enlarging the existing functional responsibilities of state governments. Like the interstate options, this approach mainly stresses the potential benefits of increased administrative centralization. Under it the state would assume the dominant role in regional water quality management planning, and, moreover, eventually supplant its local political sub-divisions as the chief provider of both liquid and solid waste services. Where direct provision of waste management services by a state agency has been tried, the typical organizational vehicles has been some form of a statewide environmental utility. Examples of such agencies are the Maryland Environmental Service, the New York Environmental Facilities Corporation, and the Ohio Water Development Authority. This section will discuss the general advantages and disadvantages of the environmental utility approach, drawing where possible on the Maryland experience and then turn to a specific consideration of its feasibility on the Merrimack basin.[5]

The Maryland Environmental Service functions as a public corportion, located organizationally within that state's Department of Natural Resources, but operating with an independent budget. The MES has the authority to develop and implement five years management plans for river basin areas which it designates. MES staff draw heavily on existing county water and sewer plans and then seek to rationalize any conflicts among them and insure that authorized abatement actions will meet water quality standards. The basin plans must be approved by the affected local jurisdictions (counties) before they become official, but approval then constitutes a binding commitment on the county's part to implement all measures called for. The MES then builds the waste treatment facilities and finances them by issuing bonds secured by anticipated revenues but backed up in case of default by authority to divert state-local shared tax revenues. The MES operates all plants that it builds under its regional planning process. There are also two other ways by which MES may construct and operate a waste management facility--under a "mandatory response to a request" and a "response to a directive". The law provides that any governmental entity or privately owned concern in the state may request the MES to provide liquid or solid waste services. The MES is

obligated to provide such services, the only two negotiable items being the start date and the rate. The "response to directive" provision stipulates that MES can be ordered to step in at the request of either the Secretary of Health and Mental Hygiene or the Secretary of Natural Resources to enforce a pollution abatement order where there has not been compliance. This provision is intended to be used where imminent hazard to public health or natural resources exists and cannot be resolved by responsible local authorities.

The Maryland experience with the MES has not been sufficiently long to draw any firm conclusions from it. The agency has only recently begun to implement its regional planning program and its operating experience thus far has been limited to small treatment plants serving state-owned institutions. However, it is possible to cite some general advantages and disadvantages of the state utility approach as it has been followed in Maryland. The advantages are essentially those that accrue to greater administrative centralization. The disadvantages in turn are those costs attached to the removal of politically important matters from strictly local control.

Important benefits of a state-wide approach to providing waste management services include:

- scale economies in construction; a fewer number of larger, regional plants built according to region-wide plans will result in lower per unit service costs (Criterion #2);

- operating economies available through volume purchasing of chemicals and other supplies, central technical and administrative staffs, central laboratories and emergency equipment stocks (Criterion #2);

- financial cost savings through aggregation of larger bond issues over a region or an entire state, thus being able to offer larger, more attractive financial packages to investors which will carry lower interest rates (Criterion #2 and 5);

- increased technical and managerial competence, attracted and retained through higher salaries and more satisfying job situations (Criterion #6);

- improved treatment effectiveness, resulting from the combination of regional scale planning, improved central support services and the increased technical and managerial staff competence.

But as has been argued at several points in this study, the essential decisions involved in water quality management planning are inherently political in nature and have important impacts both within a community and between it and its neighbors. These decisions include how many plants to build, of what type, at what cost, located where, serving which towns, and operated by whom. The state environmental utility model, as exemplified by the Maryland Environmental Service, in effect assumes that communities will be willing to surrender their autonomy over decisions such as these in return for the types of hard economic benefits cited above. This is a proposition that is not well established. The MES planning process is from the "top down". There is a real question whether state-local planners will possess the necessary sensitivity to local issues and inter-local differences needed to gain acceptance for MES regional plans (Criterion #9). The role given to municipal and county governments in the planning process is an extremely passive one, that of approving plans prepared elsewhere. County approval is required before a plan becomes official, but even this safeguard is weakened by the Maryland provision that through a special joint resolution of the two houses of the legislature a county veto can be over-turned. Also, in terms of continuing citizen access and input to MES planning, the relative remoteness of a state-local agency from the individual community helps to insure that communication will be infrequent and difficult (Criterion #10). Finally, the MES by virtue of its statute is not able to engage in water-related land use planning activities (Criterion #4). This is a critical deficiency in developing comprehensive regional plans where, like on the Merrimack, non-point services are such a major cause of pollution, but this need not be a necessary feature of a state-level arrangement.

A state environmental utility solution on the Merrimack would be inconsistent with current state policy which looks to existing regional planning agencies as the most likely candidates for areawide water quality management planning. Furthermore, RPA's despite their failings are not "top down" planning agencies and would not be nearly as remote as state level planners from the communities they represent. RPA's can and do engage in advisory land use planning and thus their multi-functional character reinforces their comparative advantage over MES-type planners when it comes to areawide work. Of course, in a Massachusetts setting the MES model could be altered so that the Service continued to be responsible statewide for construction, finance, operation and maintenance but areawide planning was delegated to RPA's or other planning agencies of comparable geographic scope. This variant, assuming RPA's could be granted authoritative planning status in their present or some revised form, could potentially be implementable on the Merrimack. The politically loaded planning questions could be handled by the more accessible, accountable RPA while the technical problems of finance and facilities management could be dealt with by better paid, highly trained state-level professionals.

A further variant on the MES model which might prove more workable in Massachusetts would be a two-tier management agency, that is, a statewide environmental utility with decentralized regional management components distributed approximately as the current RPA boundaries. The state-level utility would exist to provide financial guidance and bond-issuing expertise to the regional utilities as well as to any municipalities and industries that might be outside an organized regional utility. The smaller regional utilities would be chartered by the state-level unit and would provide waste treatment services such as financing, construction, operation and maintenance services to a specified region or groups of communities in the state. Creation of the regional utilities would be voluntary and by petition to the state environmental utility. This last variant would thus not only keep planning closer to the individual communities but operations as well. This would definitely make the environmental utility concept more palatable to Massachusetts towns suspicious of distant institutions and jealous of home rule perogatives.

A final variant on the MES model would be to keep the two tier structure, but restrict the Service to monitoring and technical assistance and thus keep it out of local facilities management except on an advisory basis. The Service could still have so-called "temporary management authority" to step in when local governments fail to run their treatment plans according to state O&M regulations, but this would be only until the locals could correct the deficiencies and again assume management responsibility. This variant goes the farthest toward meeting the local sentiments for autonomy and home rule.

4. Sub-State Regional Solutions

This section takes up a number of possible institutional alternatives at the sub-state regional level, that definable middle ground which is less than inter-state or state-wide in scope on the one hand yet more inclusive than existing inter-munitipal arrangements on the other. It presents four sub-state alternatives, all closely related but showing important differences among themselves:

1) Intra-State Basin Authority. A single agency combining planning and operations responsibilities and having jurisdiction over the entire Merrimack River basin in Massachusetts.

2) Intra-State Basin Planning Agency and Separate Basin Management Agency. Same geographic scope as the previous alternative, but here the planning and operations responsibilities are split between separate, coordinate agencies.

3) Separate Regional Planning Agencies and One Basin Management Agency. Two separate RPA's on the Merrimack providing planning inputs to once basin-wide management utility.

4) Separate Regional Planning Agencies and Coordinate Regional Management Agencies. Two separate RPA's on the Merrimack, each doing the planning for a coordinate management agency having the same geographic scope.

All the differences between these four alternatives are accounted for by whether or not planning and operations responsibilities are integrated, and secondly by the number and geographic scope of the planning and management agencies involved. All four are responsible options on their face and require further analysis.

Drawing on the earlier criteria development work done in Chapter C of this study, seven principal evaluative criteria to these sub-state regional alternatives were identified and applied. Some of these criteria come directly from Chapter C, while others represent important extensions or additions to them. The criteria are necessarily somewhat subjective and not always capable of unambigious application but we feel they highlight the major issues which need to be brought out when choosing among the alternative regional arrangements. They call for preferring those alternatives which:

- Build on existing institutions wherever possible. In this case this means making use of existing regional planning agencies, the only candidate regional agencies on the horizon in Massachusetts (Criterion #9).

- Increase planning rationality, meaning here to prefer more hydrologically inclusive boundaries for water quality management planning agencies (Criteria #1, 2 and 3);

- Improve technical/managerial performance, again referring here to more inclusive geographic boundaries, this time for the management agency. The presumption is that a larger, more inclusive agency will be better able to attract and retain competent technical and administrative personnel (Criterion #6);

- Insure a responsive, accessible decision-making process. It is assumed that a planning agency with lesser geographic scope will be closer to individual local governments and seen as more accessible to citizen input. It

is also assumed that a planning agency which exists separate from an operations oriented management arm will be a more democratically responsive institution attuned to the political implications of proposed technical engineering solutions (Criterion #10);

- Minimize any perceived threat to local home rule. Here it is posited that independent-minded local communities will be more likely to be distrustful of larger, more geographically inclusive agencies, for planning as well as for management;

- Build up agency acceptability. Alternatives which appear to be consistent with the objectives and plans of important federal, state and regional agencies are more likely to win those agencies' support and hence have a greater probability of being implemented;

- Take into account legislative reaction. Largely determined by how the alternative rates on previous two criteria. The legislature's view of the alternative, especially regarding its practicality and ease of implementation, will have a major impact on its eventual success or failure of enactment.

The remainder of this section will analyze each of the four sub-state regional alternatives in the light of these seven criteria.

Intra-State Basin Authority

No intra-state basin agency now exists on the Merrimack in Massachusetts. It would have to be created from scratch. A basin-wide authority would be preferable to a less inclusive agency from the standpoint of having sufficient hydrologic scope to support national water quality management planning techniques. A basin-wide authority would also have an edge in being able to compete for better trained, professional staff needed to operate sophisticated treatment facilities. However, it would likely be viewed by the smaller towns in the basin as a distant, isolated institution which could someday threaten their ability to continue pursuing strictly narrow local interests in the area of wastewater management. There is also the danger than an integrated river basin authority of this size would tend to be dominated by its management component and subordinate its planning interests to keeping its engineers and builders busy devising capital intensive, structural solutions to wastewater problems. It is known that RMPC policy favors a role for RPA's in future regional water quality management planning because of their

unique multi-functional responsibilities and experience, and it is not clear how there could be an RPA role under the river basin authority alternative. Major legislation would also be required to implement the basin authority approach.

The discussion by citizens heard at the various public information meetings sponsored by the Corps was very cautious when it came to discussing major institutional changes. Local community sentiment in the basin would not seem to favor the creation of a large, new, potentially isolated but yet dominating authority on the river. The likelihood of this coming about has obviously been further reduced by the fairly decentralized engineering alternatives.

Intra-State Basin Planning Agency and Separate Basin Management Agency

Separating out the politically sensitive planning function and giving it some needed distance from technical domination makes this second alternative a little more palatable, but it still suffers from serious problems. Neither agency proposed exists presently in any form; both would have to be built from the ground up. The basic level planning agency represents an expensive, single-purpose entity which lacks the related planning responsibilities which RPA's carry in the areas of land use, open space and recreation. It doesn't make much sense either functionally or politically to try to create a basin-level planning agency by combining the existing RPA's. The RPA's carry many other planning responsibilities which do not naturally fall along hydrologic lines, and existing differences of view-point among the RPA's would also surely temper any designs to merge. Both the basin planning and management agencies would loom large and remote in the eyes of many of the communities involved and perhaps not be acceptable as potentially dominant outside forces.

Separate Regional Planning Agencies and One Basin Management Agency

This alternative, by relying on the existing RPA's in the basin for its water quality management planning, meets the test of building on the existing institutional structure. However, substantial changes would have to be made in the constitution and powers and authorities of existing RPA's to enable them to meet the challenge of this essentially 208-like assignment. Legislative enactment which may be difficult to obtain will be required. The reconstituted RPA's would presumably look less threatening, more accessible to independent-minded towns than did the basin-wide planning agency. But it is still the basin

management agency which might appear too large and potentially dominant in the eyes of the towns. No doubt its basin-wide scope should enable it to do a more competent management job with higher paid, more professional staff, but its very strength and scale will make it unattractive to the towns worried about their freedom of maneuver.

Separate Regional Planning Agencies and Coordinate Regional Management Agencies

This alternative, then, is the most "decentralized" one given that some move away from the status quo and toward regionalism is desirable and necessary. It builds on the existing RPA base, which would have to be revised somewhat but not invented. It tries to reassure local communities that by its less than basin-wide scope and its separation of planning responsibility from an engineering-dominated management agency that regionalism need not mean the total submergence of local control over the vital decisions affecting waste management. The use of RPA's in the planning role is also consistent with what appears to be current state policy. The provision for regional management agencies having coordinate geographic scope with the RPA's is less desirable from the stand point of planning rationality and increased professionalism than would be a basin-wide entity. But then smaller geographic scope might also make them less threatening and hence more acceptable to the local communities. Regional management entities should still represent a substantial improvement in the efficiency and effectiveness with which existing, as well as any new, treatment plans are run. It may be, however, that even these fairly narrowly defined "regional" management agencies will not be acceptable to local governments anxious to protect local autonomy against outside authority. As with the state level option, it might be more practical to limit such regional entities to monitoring and technical assistance, and perhaps temporary "takeover" authority, rather than give them direct local management powers. They would be available technical resources for local treatment plants to draw on in attempting to upgrade the efficiency and effectiveness of treatment services. But they would not be seen as instruments of some kind of regional government over which they have no effective control.

E. AN INSTITUTIONAL ARRANGEMENT FOR THE FUTURE

In Chapter B, we indicated how the recommendations of the MWM Study could be implemented by institutional structures and processes already in being, assuming a widespread willingness to make them work toward those ends. Hopefully, the necessary political consensus will be developed through enlightened leadership and extensive public participation in the planning and decision-making process. Political commitment would generate the necessary resources--manpower, money and expertise--to do the job. Under such optimal conditions, the institutions needed to secure environmental objectives in the MRB (and elsewhere) for the future might be virtually the same as those which now exist.

As experience unfolds, however, some fine-tuning and perhaps even some reform of the institutional system may come to appear desirable as a means of hastening attainment of water quality and related environmental objectives. Incentives to environmentally beneficial behavior could be improved at a number of points. Quality controls over environmentally disturbing activities could be upgraded. And decision-making processes could be strengthened and coordinated to a higher degree, especially for resolution of political conflicts if and when they arise. Some redistribution or redefinition of powers, functions and duties among different levels of governments may finally prove necessary for these purposes, or new institutions could ultimately be brought into being.

We are unable to predict what institutional changes, if any, will appear both desirable and politically feasible with the passage of time.[1] But we can identify a number of possible changes, of greater or lesser scope, that we believe may be appropriate topics for public debate in the course of pursuing water quality and related programs along the Merrimack. In offering this list, we must emphasize its provisional nature; it does <u>not</u> presently constitute a set of preferred alternatives, but only of ideas which, in our view, may be or become worthy of serious consideration.

1. Strengthening the Role and Constitution of the RPAs

As previously noted, plans developed by the RPAs have advisory rather than mandatory status, except for the leverage RPAs can exercise through A-95 and other review processes. There is no assurance that municipalities, state and federal agencies with developmental missions, and private developers will consider themselves as bound to honor the provisions of a duly adopted 208 plan. Yet in view of the effort that will have gone into preparing it, including the federal money spent on it and the public participation which it will reflect, a persuasive case can perhaps be made for

reinforcing the implementation of 208 plans. Besides awarding permits and construction grants consistently with those plans, DWPC might be expressly empowered to issue judicially enforceable orders directing any person to comply with obligations to which he is subjected by the terms of such a plan or of a regulatory program established thereunder. Thus, if the plan identifies an area as in need of sewering because of multiple septic-tank failures and calls upon a town to sewer the area, DWPC could order the town to take that action, consistently with the wastewater management system envisaged in the plan. DWPC already has the power to bring intermunicipal districts into being where necessary; this power might well be extended to include arbitration of intermunicipal contracts for sewage treatment services in the event that negotiation among the concerned cities and towns should reach an impasse. In either case, DWPC would use its powers to promote implementation of the approved plan. And it bears repeating that under existing law, discharge permits may be required from DWPC even for nonpoint sources affecting groundwaters, if municipalities should fail to regulate such sources properly and in accordance with the plan.

A mandatory 208 plan need not be an inflexible one. It will be subject to annual review through a continuing planning process for the 208 area, and may be amended from time to time as circumstances change. At any given time, however, the plan would have the force of law until it was changed through the prescribed review process. A changeable 208 plan, in other words, need not be any the less mandatory.

But if 208 plans are to have such force--and especially if they are to be integrated eventually with other types of mandatory regional planning--it may also be desirable to amend the constitutions of the RPAs that have the power to prepare and adopt such plans. In particular:

- The allocation of votes on the RPA Commission might be revised to reflect, in part, differences in the populations of the respective member municipalities.

- Membership on the commission might include a larger proportion of popularly elected officials from the member cities and towns, who could serve on the commission either ex officio (e.g., aldermen, city councillors, mayors) or by direct election to the commission.

There is nothing new in either of these suggestions; in fact, their validity appears to have been recognized by some spokesmen for the RPAs themselves.[3] Such reforms would bring the RPAs more closely into line with local political realities, and would go far toward

giving mandatory force to such a plan by express provisions of state and federal law. As previously noted, the Federal Act already goes part way in this direction with respect to discharge permits and construction grants, and comparable provisions appear in the MCWA. Further steps might be:

- to amend the regional planning law so as to except 208 plans from the characterization of RPA plans in general as merely "advisory."

- to spell out requirements, in state and federal law, that all government agencies whose activities affect water and related land use shall administer the programs in their charge (licensing, subsidizing, project undertakings) consistently with duly established 208 plans, except where it is certified, through some formal procedure, that overriding reasons of state or federal policy require departures from those plans.

- to provide similar mechanisms for testing and reviewing private development proposals, without regard to whether the developer seeks an official permit or subsidy for his undertaking.

Actually, the foregoing steps would not represent a radical departure from current trends. The municipalities in a 208 area will largely have resolved to proceed toward implementation of the 208 plan. The fiscal incentives and regulatory pressures of the water quality laws will reinforce that resolve. Through determined and imaginative exercise of municipal powers over land use--as we saw in Chapter B--cities and towns in a 208 area can also subject private development proposals to the necessary review for consistency with the regional plan. It could further be provided in the 208 plan that the RPA itself will review municipal decisions for the required consistency, upon petition of any aggrieved party. The RPA's conclusions in such case might be of persuasive rather than binding force, with ultimate appeal to the courts or to the State RMPC to settle the issue in the event of continuing disagreement. However it is done, the 208 plan should provide at least some means of monitoring events in the light of the plan. As for state and federal agencies, they are already required by their respective Environmental Policy Acts to weigh and to minimize the adverse environmental impacts of their actions. Consistency with the impact analyses[2] that went into the formulation of the 208 plan might well be a criterion by which to judge whether those agencies have properly discharged their responsibilities.

The state may also have an affirmative role to play in

justifying a majority voting procedure on the commission for resolving conflicts when attempts at persuasion and consensus-formation have failed. In this connection, it should be borne in mind that a qualifying 208 planning agency "shall establish procedures for plan adoption and resolution of major issues."[4]

2. Promoting Quality Control Through a State Environmental Service

Cities and towns in the basin may find their technical resources strained to the limits by having to build, operate and maintain advanced waste treatment facilities in accordance with high professional standards. Agencies in charge of planning and regulating land use for the protection of water quality may find that they lack a reliable and sufficiently comprehensive data base to do their jobs properly. The monitoring of discharges, stream quality and control procedures may be spotty and infrequent because of the scarcity of qualified personnel to do this work. In all these respects (and in others that might be cited), the quality of performance in wastewater planning and management will be jeopardized unless adequate resources--expertise, manpower and money--are committed to each of the component tasks.

The needs here identified might come to justify establishment of a Massachusetts Environmental Service (MES) within the Office of Environmental Affairs, with authority to perform through regional MES offices--including one for the Merrimack River Basin--any or all of the following functions:

- By voluntary agreement, MES could furnish any wastewater management service to a municipality district or industry requesting it, including the planning, financing, construction, operation and/or maintenance of treatment facilities. The cost of the service (net of any available government subsidies) would be reimbursed to MES out of municipal appropriations or user charges.

- By order of the DWPC, the MES might be directed to assume temporary control of any wastewater management project or facility, in the event of persistent failure by a city, town or district to comply with lawful requirements respecting the planning, financing, construction or operation of such a project or facility.

- MES could assist DWPC in monitoring the operations of all treatment plants and could render technical assistance to operators as needed, with a view to

making enforcement action unnecessary in most cases.

- MES could monitor all types of discharge to ground or surface waters and report its findings to the concerned planning and regulatory agencies.

- MES could assist in the development of technical criteria for measuring or predicting impacts of various land uses on water quality, and for choosing among alternative control strategies or techniques.

A state-level agency should be in a better position than any regional or local one to marshall the necessary resources for the foregoing tasks. MES might be empowered to issue its own revenue bonds to meet its capital expenses, but it would not be an independent authority. Rather, it would be a technical line-agency within the Office of Environmental Affairs. The extent to which MES actually got into the business of wastewater management would depend primarily upon how well it succeeded in selling its services to municipalities and industries. We can imagine more than one discharger, struggling to meet the fiscal and regulatory burdens of wastewater management, who might be glad to turn some part of this distasteful task over to an efficiently functioning, expense-saving MES.

3. Improving Fiscal Inducements to Water Quality Control and Related Environmental Amenities

Under current law, cities and towns need pay only 10% of the costs of constructing new treatment facilities, but will receive no subsidies for operating and maintaining them once they are in place. There is a two-fold danger in this set of conditions: that treatment facilities will be overdesigned, and that they will not be properly operated and maintained as required by the terms of the applicable discharge permits. Better results on both counts might be achieved if the local share of construction costs were to return to 20%, and if O & M subsidies were to be made available for publicly owned facilities that met the prescribed operating standards. Applicants for these subsidies might further be required to accept the technical assistance of the MES in expending them to good account. The net financial burden on cities and towns of this suggested shift in fiscal incentives should be no higher than under present law, and a major obstacle to securing local approval for treatment plant construction--steep prospective O & M costs--could thereby be removed. Significant changes in federal and state law would be needed for any such realignment of incentives.

The inability of the state, under existing law, to order the sewering of an unsewered area has already been noted. Perhaps the DWPC should be given this power, especially if its exercise conforms to the provisions of an applicable 208 plan or is otherwise necessary to reverse cumulative pollution for nonpoint sources. The developmental consequences of sewering can be controlled through stricter land-use regulation at the municipal level. However, any order to sewer an area should be accompanied by assurances from the state that federal and state subsidies will be available to cover a substantial percentage of the cost, even if the contemplated work does not stand high on the state's official list of priorities for capital funding. Amendments to the MCWA might be necessary to permit a portion of funds available under state bond issues to be shifted in this manner from treatment to collection facilities.

Turning next to nonstructural measures for protecting water quality, we remark the paucity of funds under federal and state programs to aid the purchase of critical water-related lands for open-space purposes. Absent some new financing mechanism, these programs may well remain underfunded in the face of heavy demand. One possibility might be to impose through state law a special capital gains tax on real estate transactions, with the proceeds to be deposited in a separate fund from which grants could be made to public and private nonprofit agencies to purchase lands for conservation or recreation. The rationale for such a scheme would be to capture for the benefit of the public some portion of the gains in land value that largely result from government decisions. (E.g., publicly financed treatment facilities will improve water quality and, in consequence, increase the value of riparian properties.) The suggested fund might also be used to compensate owners whose property is deemed to have been taken by eminent domain or has otherwise declined substantially in value as a result of local land-use regulations or other government decisions. These ideas, we admit, may seem radical at the present time, but they may eventually gain support on grounds of social equity as well as of environmental protection.

FOOTNOTES

[1]Budgetary limitations prevented us from conducting a broad survey of opinion concerning institutional options in the basin, as seen by interested officials at all levels of government and by the informed public.

[2]See section 208(b)(2)(E) of the Federal Act.

[3]"...it is essential that the regional policy body be sufficiently accountable to and representative of the public. Amendments to the composition of regional planning agencies must be made concurrent with an increase in authority. Elected executives of general local government must have a strong role. Principles of 'one man one vote' must also be considered in determining proper representation." Memorandum of April 18, 1973 prepared by the Work Program and Policy Committee for the 1973 Conference on Crisis in Regionalism. The document recites that it was "primarily developed through a series of very frequent special meetings of all of the RPA Directors in Massachusetts...." See also H.5101, a bill sponsored in 1974 by NMAC and other RPAs.

[4]40C.F.R.126.11.

F. GENERAL WATER-RELATED LAND USE CONSIDERATIONS

The over-all goal of land use planning is to determine how people can best use land to make life more humane and worth while; and insure that the land is used accordingly. For many years the "best use" was evaluated primarily in terms of economic values. Communities encouraged the type of development that satisfied the economic needs of the community by making land in prime locations available for those uses. More recently the concept of best use has been broadened to include a wide range of community values and needs. For example, many areas are now trying to define and preserve the character of their community. This may involve consideration of community size and rate of growth; cultural and aesthetic values, and a variety of social needs. One of the issues that has become most prominent in the land use field is the relationship between the physical and the man-made environment. This relationship is reciprocal since building will inevitably cause some changes in the natural systems present; and the characteristics of the physical environment can determine the nature of the development.

Our primary concern is with the water or hydrologic system since recent evidence has shown that the particular land use pattern created by both public and private forces can have a significant impact on water quality.

1. Water Quality Problems and Land Use*

A particular land use pattern is determined by the characteristics of form, density, use mix, open space, and rate of land conversion. Those underlying determinants can create four types of water quality problems.

- Point source waste discharges
- Non-point source pollution
- Harm to natural systems
- Restriction of existing or planned water uses.

Point Source Discharges

Point discharges occur at those fixed points on the water course to which collected wastewater is delivered. Generally, there are four major land use categories that contribute to point sources: residential, commercial, industrial and energy generation. Water

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* The following discussion draws heavily on a paper "Interrelationships of Land Use and Water Quality: An Overview" presented by Stephen C. Nelson at the Conference of the American Institute of Planners, October, 1973.

quality engineers have historically concentrated most of their attention on point sources since they are amenable to treatment either at the source or at the final discharge. The water quality impacts of organic waste, nutrients, thermal waste and toxicants are well-known, and the assumption has always been that these can only be handled by new or expanded treatment facilities. However, the amount and type of land use existing or planned for an area is also a primary variable. For example, a development in an area will affect the amount and content of waste that must be treated and discharged. A high density may cause point source waste of loads from a particular area to reach a point that exceeds the assimilative capacity of the receiving water body.

Another factor to consider is the community's growth rate. It may exceed the local government's ability to provide additional capacity. Explosive growth in a plant's service area can saturate its capacity and cause it to become an environmental nuisance.

Non-point Discharges

Pollution that originates from dispersed areas is termed as non-point discharge. Because of the nature of the source, these loads are not usually available for treatment. The major types of non-point discharges that are relevant to this area are:

- Urban storm run-off
- Agricultural drainage
- Construction run-off

Urban Run-off -- Urban run-off affects water quality in two ways. First, it transports the previously landlocked refuse of man to the water environment. Second, the increased magnitude of stormwater run-off due to development caused changes to the physical configuration and hydrology of the water system. The constituents of urban run-off present a varied picture. They range from standard biochemical oxygen demand to the toxic metals. Many of the less studied pollutants are closely associated with man's transportation systems or his maintenance of them. In snow regions, for example, salt and other snow melting chemicals pose a seasonal problem. The residue lead sprayed into the atmosphere by automobiles using leaded gas causes water quality impact. These pollutants include grease and oil, trash and plain old street dirt. These pollutants not only produce unaesthetic responses to the stream, but they also reduce light penetration, kill fish and other aquatic creatures, and eventually exert a great oxygen demand.

Urbanization also affects thermal properties of receiving waters. Summer temperature rises of ten to fifteen degrees have been predicted in streams in areas undergoing urbanization.[1] Such thermal effects are caused by the increased temperature of urban run-off, the heating of shallow impoundments, and the increased direct solar input caused by cutting away stream bank vegetation.

Another severe result of the increased stormwater run-off due to urbanization is stream enlargement. This phenomemon, as described by Hammer, results not only in aesthetic damage to stream banks but to substantially increased stream bank erosion and stream sedimentation.[2]

Agricultural Drainage -- Agricultural drainage is another significant source of non-point pollution. Water flow over crop land and feed lots transports soil particles, manure, salts and nutrients, and pesticides from the land into the surface water. Chemicals and nutrients in solution may also percolate through the soil into the ground water. Run-off in logging areas also causes water quality impact by discharging increased nutrient loads, sediment, and thermal loads. These problems become increasingly acute in areas of intensive agricultural or silva-culture use where waste loads are concentrated and the waste assimilation capacities of receiving waters are inadequate. Despite erosion control efforts to date, it has been estimated that between fifty and seventy-five percent of the sediment washed into the nation's waters each year comes from crop and pasture land.[3]

Construction Run-off -- Erosion at construction sites has long been recognized as a serious problem and many control measures have been developed. For example, in Fairfax County, Virginia, highway construction involving 197 acres contributed 37,000 tons of sediment to the local streams over a three year period.[4] This sediment chokes streams and fill reservoirs, severely limiting their usage for recreation and aesthetic enjoyment as well as their capacity to accommodate floods.

Harm to Natural Systems

Flood plains, natural vegetative cover, and ground water recharge areas are some of the natural systems that operate in the manner so as to reduce the impact of pollutants. The use of flood plains and low lying shoreline areas for development has caused many economic losses as well as losses of life over the years. It is now generally accepted that such development may be unwise in these areas. Less well understood however, is the fact that flood plains function as natural safety valves and recycle centers. Storms which cause flooding wash great quantities of sediment and nutrients into the streams. When a river overflows its banks, the velocity decreases and the nutrient

rich sediment settles out. As the river recedes, it leaves behind the sediment load. Thus, the flood plain has acted as a temporary storage area for large volumes of water from which suspended solids have settled out to enrich the soil. When man develops these flood plains, and constructs flood control facilities, the natural role of these low areas is subverted. The sediment remains in the river to build up sand bars, fill lakes and bury wet lands.

Trees and other forms of vegetation play a valuable role in retarding both the quantity and the velocity of stormwater run-off. This benefits water quality by reducing the potential for stream bank scouring and instream erosion and also by trapping and settling out various inpurities carried by the stormwater run-off. Removal of vegetation during the development process is of significant impact on water quality conditions.

The perviousness of the ground is also important in reducing the amount of run-off and in absorbing various nutrients carried by that run-off. Development and the creation of impervious surfaces reduces infiltration thus lowering the level of the ground water table. In time this reduces the base flow to streams and waters. In coastal areas, this encourages the intrusion of salt water into the aquifer system. This impact is especially important, of course, if development takes place over primary groundwater recharge areas. Planners have been hindered in trying to protect such recharge areas due to the relative inadequacy of data on groundwater hydrology.

Restriction of Existing or Planned Water Uses

Development planned and approved without consideration of water quality impact can result in serious conflicts with existing and planned beneficial uses of surface and ground water systems. The filling of wet lands (fresh and salt water) has become a common example of such preemption. Such action can result in reduction in the propagation of marine life, thus affecting commercial and sport fisheries and shell fish harvesting. It can alter the diversity of wildlife species and also reduce the surface water retention and storage potential of such areas. In addition, new industrial outfalls and domestic sewage treatment plants are often approved upstream from recreational water use areas, domestic water supply facilities, and high quality aquatic zones. Such conflicts have resulted from a lack of priorities as to which water uses were most important. On the other hand, priorities-setting is hindered by a lack of data and knowledge concerning the water quality response of streams and lakes and coastal zones when new discharges are introduced.

2. Land Use Strategies

It is clear that if the water quality problem is to be solved, land use strategies must be incorporated into wastewater management plans. In addition, water quality considerations should play a more important role in the development of land use plans. Two questions now arise -- what land use strategies can be developed to make land use and water quality compatible; and what institutions should be involved?

There are six basic strategies that can be employed. They include:

- Growth limitation
- Growth guidance
- Environmentally sensitive areas
- Critical use siting
- Site development controls
- Land management control

Growth Limitation

- Increased point discharges may reach the volume where, regardless of treatment technology, the assimilative capacity of receiving waters is exceeded.

- Increased urban run-off and subsequent non-point loadings are bound to occur as land is exposed and impervious land areas increase.

- Stream enlargement, both an erosion and aesthetic problem, and increased peak flow levels will naturally occur proportionate to urbanization.

It is doubtful that even the strictest run-off control and treatment practices can avoid all the damages induced by growth, particularly in areas having a sensitive land/water balance (i.e., estuaries, stratified lakes, coastal and wet lands areas, headwater regions). However, there can be little question that modification of growth rates and land consumption rates will reduce the potential threat which urbanization poses to water quality. Given the high cost of meeting current water quality standards and treatment requirements, the cost savings could also be substantial.

From a legal standpoint, protection of water quality is a permissible objective of growth regulation. Particularly if care is taken to establish a causal relationship between population size and density and stream and ground water quality. It can be demonstrated that protection and improvement of water quality is required by Federal Water Pollution Acts and state laws. Further, it can be shown that these laws apply to both point and non-point sources.

In practice, water quality protection may become one purpose for regulating population totals and concentrations. However, a particular regulation may have several other equally valid justifications. For example, regulations designed to influence or even dictate growth patterns may be supported by the need to prevent overburdening of a range of public facilities and services. The recent court action in regard to the Ramapo, New York zoning ordinance testifies to the validity of this approach.[5] But in each instance it is necessary to balance the requirement that communities provide reasonable levels of public services on a non-discriminatory basis against the reasonableness or necessity for regulation. It is this balancing which determines the propriety of any growth control. A similar move was made by citizen referendum in Boca Raton, Florida where an attempt is being made to limit the population to 100,000 by restricting the number of dwelling units to 40,000.

The amount, type and density of growth assigned within a development region should be based, in part, upon:

- The water quality standards set for those water bodies affected.
- The state-established waste load allocation for streams, stream sections and lakes (and coastal waters and estuaries in ocean-front regions) within the sub-areas.
- The existing and planned capacity of sanitary sewage collection and treatment systems.
- The non-point waste load potentials of each sub-area.

Priority attention should be given to guiding acceptable levels of growth into sub-areas possessing adequate sewer and other urban services and characterized by low erosion potential.

Zoning has been and will continue to be used as a primary control over location, density and planning of growth. With little or no modification, most ordinances can be used to implement water quality-related land use plans.

The states are playing an increasingly important role in land use regulation. Ten years ago, Hawaii was the only state with a land use control system. Now several states (California, Vermont, Maine, Florida, Wisconsin, and Delaware) have asserted strong land use perogatives and many other states are focusing on selected land use issues. The current state innovations in land use control include zoning of all land, coastal zone restrictions, state intervention when localities fail to act, and control of environmentally critical areas and regionally significant development.

Environmentally Sensitive Areas

Land use plans should be prepared with special attention to the protection and preservation of environmentally sensitive areas. Such areas should be assessed in terms of their importance in reducing stormwater run-off volume and velocity, absorbing non-point waste loads, protecting surface water quality, recharging ground water, and retention of sediment. Particular attention should be given to flood plains, shorelines, wetlands, recharge areas, steep hillsides, and other erosion-prone areas. Realistically, not all environmentally sensitive areas can be preserved in their natural state. However, strategies could be planned at regional levels to limit development to those forms which minimize potential damage. There are a number of goals which can be accomplished in the preservation of such areas: for instance, protecting stream banks from development can serve both flood damage prevention and recreation goals as well as reducing water quality damages.

The techniques which have been used to preserve such areas involve a variety of federal and state, regional and local actions. One of the best known examples at the state level is Florida's effort to designate and protect all environmental sensitive areas, Wisconsin's laws relating to the protection of flood plain and lake shoreline areas, and Delaware's effort to protect its coastline.

In other cases, special districts have been set up to protect environmentally sensitive zones. For instance, in 1965 the San Francisco Bay Conservation and Development Commission was established to control land development around the bay. Similar districts have been set up in New Jersey to guide development on public and private land. Other techniques include low density zoning, flood plain zoning, and various kinds of acquisition programs such as have been set up in Florida, New Jersey, New York, and Illinois.

A significant local program has been followed by Boulder, Colorado, which has been involved for several years in a program to protect the foothills around the edge of the city and to eventually form a greenbelt.

Scenic or development easements are also of value in such efforts. Other techniques include financial incentive programs, fill and dredge statutes, tree protection ordinances and mandatory dedication laws such as the one used in Edina, Minnesota (i.e., required dedication of flood plains areas within proposed subdivisions).

Critical Use Siting

In formulating both comprehensive plans and water quality management plans, the planner should attempt to locate major facilities and land use activities where their affect upon water quality will be minimized and where incompatibility between various uses of water will be avoided. Certain land uses generate wastewater discharge of potentially major impact and herein are called critical uses. Examples of critical uses include power plants (thermal pollution), sewage plants (BOD, bacteria and nutrients), solid waste sites (groundwater pollution), agricultural feed lots (nutrients), water treatment plants (water withdrawal), various forms of industry (all types of pollutants) and recreation areas (human waste, siltation, aquatic disturbance.).

Critical use locations are often difficult to anticipate within a land use plan and must usually be handled on a case-by-case basis. It does not follow, however, that proposals for such uses should receive less formal analysis. In fact, since they tend to have such large potential impact, they should receive more attention. This requires the preparation of criteria defining critical uses to be especially assessed and procedures for actually conducting such assessments.

Site Development Controls

The details of where and how urban land uses are planned and developed are of substantial importance to water quality. While the areawide land use plan may indicate the sanitary waste effluents can be adequatly treated for Area X at a prescribed density, the quality of site planning and development within Area X essentially determines the amount of non-point pollution. Thus what happens on each and every parcel of land must be controlled with particular regard to reducing stormwater run-off and erosion. Cummulatively, these small individual actions constitute a major impact on an area's water quality conditions.

Strategies for controlling site planning and development include:

- Encouraging proper site selection (develop procedures to guide developers to sites which are physically appropriate for the intended use and will thus exert less impact upon the natural environment).

- Modifying project size and mix (encourage development mix and intensity compatible with the natural features of the

site, with assimilative capacity of receiving waters, and with other off-site conditions).

- Applying sound site planning priciples (encourage site planning which minimizes run-off pollution and maximizes ground water recharge).

- Encouraging water conservation practices (it is in the interest of conserving water supply and reducing ground water withdrawal rates to require land development projects to incorporate recycling procedures and water conservation plumbing devices).

- Requiring erosion control practices (particular attention should be given to practices which leave the soil exposed for minimum amounts of time and provide for the collection of sediment and debris to prevent entry into receiving water bodies).

Techniques for implementing improved site planning and development concepts include planned unit development, regulations for preserving on-site vegetation, and incentives for projects designed in compatability with the environment.

Statewide and regional review systems are also becoming a more common method of controlling site development. In Vermont, each application for development over a minimum size must be reviewed by a district commission. Approval is based upon a set of rigid criteria including selected water quality considerations.

Erosion control regulations are becoming quite common. Mandatory control may be imposed either by the state or by the local governmental entities. Local regulations may be separate ordinances or may be contained within subdivision regulations, zoning ordinances, or building codes. Maryland was the first state which enacted a law requiring that all counties and municipalities adopt erosion and sediment control ordinances. Its Department of Natural Resources established criteria and procedures to be used by county soil conservation districts in preparing and implementing control programs. In addition, soil conservation districts in 27 states and Puerto Rico have been authorized by the state governments to issue land use regulations to control erosion. The process of issuing such regulations is laborious, however, and generally requires public hearings and referendums for passage.[6] A model state act for soil erosion and sediment control is also available from the Council of State Governments.

Land Management Control

It is important to remember that the water quality impacts of land use are not confined to urban growth areas. Agriculture, produces non-point discharges which are perhaps the most difficult to control. Widespread use of known conservation practices can significantly reduce these impacts. However, evolution of better implementation measures should be given a high priority since the problem can be expected to increase in future years.

Where agricultural land use represents a significant source of water pollution, attention should be given to the development of improved waste and land management measures governing:

- Soil conservation practices
- Animal waste disposal practices
- Pesticide application practices
- Fertilizing practices
- Irrigation management

Advisory organizations serving agricultural, forestry, and resource extraction interests should be encouraged to upgrade educational and assistance programs and to assist where appropriate in preparation, implementation and administration of better conservation regulations. Unfortunately, most erosion and sedimentation control ordinances enacted to date exempt these non-urban uses from their provisions or simply encourage utilization of approved land management practices.

A state or locality may ban the sale or use of pesticide found to be unduly dangerous.[7] They may also require wastewater be discharged from agricultural areas at environmentally proper times.[8] In addition, zoning ordinances may exclude agricultural activities from environmentally sensitive land or gather such activities together in an area particularly suited for water quality control.[9]

Prototypes for such regulatory activities include the Pennsylvania Environmental Quality Board's regulations requiring erosion and sediment control plans to be submitted for all agricultural activities by July 1, 1977.[10] Regarding mine drainage, West Virginia has regulations which require submission of plans for control of erosion, treatment of mine drainage, and revegetation. Regulations in Pennsylvania and Illinois require posting of a performance bond to insure compliance with water quality plans.

3. Conclusions

The land use strategies discussed here are not abstract concepts. They are being considered and frequently implemented throughout the country. The land use controls used to carry out these options are also very familiar, although they are often used innovative ways. Basically, these involve two types of controls; those that determine the general pattern and intensity of development; and those that set performance standards for activities taking place on the land. Traditionally local municipalities have exercised these powers. However, proposed federal land use legislation and recent state statutes indicate there is a trend toward more state and regional participation in the planning process. The increasing use of sub-state entities is particularly important since it allows the state to reconcile differences between local interests and matters of state or regionwide concern.

Our recommendation for a stronger regional thrust in wastewater planning and management is consistent with this general trend. However, the expanded role that we have suggested for the Regional Planning Agencies (and perhaps a Regional Environmental Service) is geated toward pollution control, not overall land use control. In terms of regulation of general development we expect that the local municipalities in Massachusetts will continue to exercise the primary land use control through planning, zoning and subdivision regulations. The RPAs will also continue their present role in general land use planning which is purely advisory and without enforcement mechanisms.

However, by placing the water quality planning function in the existing regional land use planning agency, the opportunity for crucial interaction between these activities is significantly enhanced. Technical expertise and input concerning the capacity and capability of the hydrologic system will be available for the land use planners; and the assumptions and objectives directing regional development will contribute to the wastewater management planning.

FOOTNOTES

1. Leopold, Luna B., "Hydrology for Urban Land Planning - A Guidebook on the Hydrologic Effects of Urban Land Use." U. S. Geological Survey Circular 554, 1968.

2. Hammer, Thomas R., "Stream Channel Enlargement Due to Urbanization." RSI Discussion Paper Series: No. 55, Regional Science Research Institute, Philadelphia, Pennsylvania, May, 1972.

3. Schneider, William J., Richert, David A., and Spieker, Andrew M., "Role of Water in Urban Planning and Management," Geological Survey Circular 601-H, Washington, D. C., 1973.

4. Golden v. Planning Board of the Town of Ramapo, New York State 2d (1971).

5. Bossellman, Fred and Callies, David, The Quiet Revolution in Land Use Control. Prepared for the Council on Enviroimental Quality, Washington, D. C., 1971.

6. 42 USC 1401, 2414, 4001 notes, 4011-4027, 4041, 4051-5055, 4071, 4072, 4081-4084, 4101-4103, 4121-4127.

7. Comment, "Rural Zoning in Nebraska," 44 Nebraska Law Review 151, (1965), Note, "County Zoning in Iowa," 45 Iowa Law Review 743 (1969).

8. Arizona Rev. Stat.

10. U. S. Department of Agriculture, "Managing Our Environment." Agricultural Information Bulletin No. 351, Washington, D. C. May, 1972.

ATTACHMENT

CHECKLIST OF LAND USE CONTROLS

The following discussion on land use controls was prepared by the Commonwealth of Massachusetts, Department of Community Affairs as part of its participation in the Merrimack Wastewater Management Study. Land use control methods available to all levels of government both inside and outside of the study area are described in terms of their relationship to water quality management. Detailed land use planning as a means of controlling non-point sources of pollution was not undertaken as part of the Merrimack Study but is envisioned as part of the official 208 planning process. The following checklist will hopefully assist in that future endeavor.

1. Federal

Detailed summaries of the controls exercised by Federal agencies are available from numerous sources. The presentation made by the North Atlantic Regional Study in Appendix S - Legal and Institutional Environment (see Bibliography) appears to contain the most extensive up-to-date summary available. Rather than attempt a duplication of this effort, it is recommended that this source be used as the basis for any evaluation of Federal controls as they relate to the study area.

2. State

a. Statewide Zoning

Summary of Land Use Controls

Hawaii is the only state in the country with a statewide zoning act. The Hawaii State Zoning Act was passed in 1961 in response to the state's continuing problem of land scarcity brought about by a rapidly growing economy and disorderly urban growth.

The Act established a land use commission and divided all land on each of the islands into four separate land use districts: urban, rural, conservation, and agricultural. The Act empowers the commission to set standards for determining the boundaries of each district. The Act also established some generalized criteria for defining land uses appropriate for each of the districts.

Although the state has authority to determine district boundaries, localities continue to exercise most of their traditional land use powers, except for conservation which is governed entirely by the state's Department of Land and Natural Resources. However, local land use control powers must be consistent with the guidelines provided by the Act and the commission. For example, localities are prohibited from allowing urban uses in non-urban districts unless a special permit is approved by the commission.

Relationship to Water Quality

Water quality is regulated through the control of the various activities found within each land use district. As previously indicated, the relationship between land use activities and their location is a critical determinant in the enhancement of water quality.

Impact on Water Quality to Date

While the specific impact of statewide zoning upon water quality is difficult to establish, the success of this method of land use control in Hawaii is generally accepted.

Constraints

The key problem faced by the Commonwealth, if it were to attempt to impose a statewide zoning control, relates to the socio-political climate within the state. Hawaii is obviously a very special case. It is a group of land scarce islands which have only begun to experience rapid development within the last 70 years. Massachusetts, on the other hand, has been a highly developed urban state for over 100 years. The jealously guarded Home Rule concept is a severe obstacle to any attempt to impose statewide zoning.

Another constraint to this type of control would be administrative. The complex nature of land use within Massachusetts would make the division of all land into general districts extremely difficult. Non-conforming uses would undoubtedly be present within each district. The various procedural systems inherent in zoning would require complex structural changes to insure the adequate melding of state, regional and local objectives.

b. Regulation of Critical Areas

Summary of Land Use Controls

Several states have recently adopted statewide controls designed to provide for the designation of specific geographic areas as areas of critical concern. The best known examples are found in Vermont and Florida. Vermont regulates land by issuing development permits. State jurisdiction extends over commercial, industrial, and residential developments larger than ten acres in size, or subdivision developments of ten or more lots. The state has established specific environmental, social, and economic criteria which a developer must meet before receiving a permit.

The Florida "Environmental Land and Water Management Act" of 1972 does not establish specific districts. Instead, it calls for the designation of specific geographical areas as "critical areas". It also empowers the state to regulate development deemed to have regional impact.

Critical areas are designed to include (1) environmental, historical, natural, or archeological resources of regional or statewide importance; (2) existing or proposed major public facilities or areas of major public investment; or (3) a proposed area of major development potential.

Developments with regional impact (DRI) are subject to a number of procedural steps before permits can be granted.

As in the designation of areas of critical state concern, regional planning agencies and local governments may recommend types of development for designation as DRI's. When permits are requested for a DRI, the local government having jurisdiction will be required to consider (1) the conformity of the proposed project to a state land development plan, and (2) the project's regional impact as analyzed in a report to be prepared by the designated regional planning agency for the area in which the project is located.

Relationship to Water Quality

The procedure for designating critical areas in terms of environmental importance suggests an obvious relationship between water quality goals and concern for the environment. Likewise, the acknowledgement that developments having regional impact need to be

regulated demonstrates an awareness on the part of these states that activities of this type can strongly affect the environment in which they locate.

Impact on Water Quality to Date

It is still too soon to measure the effects of this type of control, because it has only been three years since the enabling legislation was adopted. As with almost any form of legislation, loopholes will undoubtedly appear. However, the fact remains that a definite trend towards this type of control is becoming apparent.

Constraints

To be effective, critical areas must be clearly defined before any review processes can commence. This takes both time and money; absence of the latter is a common constraint with the Commonwealth.

Conflicts with other statewide goals will undoubtedly arise. Specifically, economic development goals may cause dissension when balanced against environmental goals.

Finally, administrative problems in terms of the power of review, the right to appeal, and the relationship of statewide goals to those of regions and municipalities may seriously impede the successful adoption of this type of relationship.

It should be noted that under a grant just received from the U.S. Department of Housing and Urban Development, the Executive Office of Communities and Development under the aegis of the State Resource Management Policy Council will undertake in concert with state and regional planning agencies and in cooperation with private groups and citizens, a State Land Resource Management Study. The ultimate goal of this effort is to effect "balanced" land use legislation designed to regulate and protect the Commonwealth's critical land resources and establish standards for guiding developments of more than local impact.

The primary objectives of the LRM study effort will be:

. To develop a framework for identifying and designating areas of critical environmental and planning concern.

. To develop regulations and criteria for determining and regulating developments of more than local impact.

. To develop a statewide land use regulatory system, including structure, regulations, standards and procedures for regulating and controlling land resources within designated critical areas.

. To develop positive programs and techniques to permit implementation and support of state and regional land use policies relative to the development and protection of critical land resources in the Commonwealth.

. To establish effective citizen participation and public information programs to enable private organizations and citizens to gain insight and provide input throughout the study period.

In view of the broad based multi-disciplinary nature and scope of the study, a Management Plan is proposed herein chiefly to facilitate the development of a sound inter-agency coordinative process during the planning, review and implementation stages of the study effort. The organizational structure proposed emphasizes close working relationships between state and regional planning agencies at the technical and policy levels. It will depend on a nucleus of professional staff from state and regional agencies working jointly and in cooperation with private groups and citizens so as to ensure that the ultimate objective of the study effort will be consistent with the goals and objectives of all parties. Only through a unified approach can the state's immediate and long-range land use goals and objectives be successfully achieved.

The report consists of two major components: (1) An organizational structure of the overall land use study including identification of staff resources and agencies' responsibilities, and a description of the coordinative and decision-making processes, and (2) A detailed description of the study objectives, work elements and outline of specific tasks for each work element.

While the purpose of the study management process is to facilitate effective coordination in the land use study effort, it is essential also that members of the Resource Management Policy Council focus on the broader issue of establishing a formal ongoing management process for coordinating and interfacing the myriad land use and related environmental programs and policies being carried out by various public agencies.[1]

[1] A PROPOSED MANAGEMENT PLAN FOR THE STATE LAND RESOURCE MANAGEMENT STUDY, Mass. Dept. of Community Affairs; May 1973.

c. Wetland and Shoreline Controls

Summary of Land Use Controls

Several states currently control the use of water-related land areas. Wisconsin, California, and Massachusetts have been selected as examples of states which have enacted the use of coastal and wetland areas.

Wisconsin

A shoreline management act was established in 1966 in the State of Wisconsin as a result of the growing demand for water-related recreation and the increasing pollution of rivers and lakes. The Act creates county and state machinery to guide shoreline development which has been jeopardized by the lack of county planning and shoreline development programs in most counties. The statute required all counties of the state to adopt zoning, subdivision, and sanitary ordinances by January 1, 1968. If counties failed to meet the deadline or drafted ordinances that were below the state's minimum standards, the law authorized the state to prepare and administer the shoreline ordinances.

Under the statute, the state's Division of Resources Development is required to: (1) assist counties in preparing the ordinances; (2) prepare standards and criteria for shoreland control; (3) form a comprehensive water resources plan; (4) create a comprehensive plan as a guide for the application of local ordinances in controlling pollution; and (5) make annual grants-in-aid up to $1,000 for administering and enforcing local ordinances.

The law applies to all navigable waters. It does not affect shoreline developments that were in existence or underway when the law went into effect. Shoreline under the law is defined as the "land area 1,000 feet from a lake, pond or flowage, and 300 feet from a river or stream."

California

In 1965, the California Legislature established the San Francisco Bay Conservation and Development Commission (BCDC) with the condition that it would expire after four years (1969) unless its plan was approved by the State Legislature and the Governor. In 1969, the BCDC plan was approved and its life was renewed indefinitely.

The BCDC was designed as a regional approach to monitor and control development of the bay, surrounding marshes and wetlands; and a 1,000-foot shoreline bank (the 1969 law reduced it to 100 feet).

One of the significant features of the Act is that it gives the BCDC authority to deny or approve all building permits that request permission to fill or extract from the bay. Agreements between local governments and the Army Corps of Engineers in regard to dredging and filling in the bay are exempt from review by the Commission.

Massachusetts

In 1972, Massachusetts amended Chapter 131, Section 40 of the General Laws, and repealed Section 27A of Chapter 130 and in doing so, combined both the Hatch and Jones Acts into one comprehensive piece of legislation for the protection of the wetlands, titled THE WETLANDS PROTECTION ACT (Chapter 784 of 1972).

The law requires that no person shall remove, fill, dredge or alter any bank, beach, dune, flat, marsh, meadow, or swamp bordering on the ocean or on any existing creek, river, stream, pond, or lake or any land under said waters or any land subject to tidal action, coastal storm flowage or flooding without written notice of intention to so remove, fill, dredge or alter, including such plans as may be necessary to describe the proposed activity and its effect on the environment. This notice of intention must be filed at least 60 days prior to any such removing, filling, dredging or altering.

All permits, variances, and approvals required by local law with respect to the proposed activity must be obtained before the notice is sent.

The notice must be sent by certified mail to the local town in which the activity is proposed together with a $25 filing fee payable to the town. At the same time, copies of such notice must be sent by certified mail to the State Department of Natural Resources and Public Works.

The Department of Natural Resources will establish a file number for the project and copies of the file number must be sent to the local authority, the Department of Public Works, and the applicant. The applicant shall post a sign displaying the Department of Natural Resources' file number at the site.

The law will govern all private parties and all governmental agencies and authorities.

Relationship to Water Quality

Wisconsin

In Wisconsin, the required formation of a comprehensive state water resources plan and the use of this plan as a guide for the application of legal ordinances controlling pollution established a direction relationship between the use of the involved land and water quality goals.

California

Similarly, the San Francisco Bay Conservation and Development Commission, through its regional mandate to control development of the marshes and wetlands surrounding the Bay, appears to dictate the activities within these areas.

Massachusetts

In Massachusetts, communities exercise this power.

Impact on Water Quality to Date

Very little factual information has been generated concerning the successes and/or failures of this type of control, either in Massachusetts or the other states. Public officials concerned with the application of this type of regulation in Massachusetts have expressed dissatisfaction in its overall performance due to the constraints discussed in Section 4 below.

Constraints

One of the common problems facing most states now employing coastal and inland wetlands controls is the issue of non-conforming use. As is the case with zoning by-laws, very little can be done to regulate these uses unless the involved governmental agency wishes to use the power of eminent domain. In Massachusetts, state officials have expressed concern over the amended legislation because it requires licensing rather than regulation. Criteria needed for the evaluation of permits are not clearly established. Another problem apparent at this time is the lack of uniform enforcement. This is due,

in part, to the previously mentioned lack of criteria. The problem is compounded by the fact that power is vested at the local level within conservation commissions rather than at the state level. The application of the law in granting permits may vary widely throughout the state.

d. Taxation

Summary of Land Use Controls

"...there are four separate techniques under the Massachusetts constitution as it exists today that can be used to reduce the pressure of real estate taxation.

Legislation can be enacted to take full advantage of the Forest and Wild Land Tax Amendment to the Massachusetts Constitution.

Taxes can be reduced by reducing the fair market value of the vacant land through the owner's granting a "conservation easement."

Legislation can be enacted to authorize the deferral of a portion of the annual real estate tax on certain open land until the time when the land is developed.

Legislation can be enacted to exempt a portion of the taxes on certain land, certain uses of which are devoted to public purposes."[2]

Still another widely used method of controlling land development is the use of differential taxes on agricultural land. Basically, this method offers private owners relief from mounting tax pressures on marginally used agricultural lands by assessing the value of the land by existing use rather than by potential use.

Relationship to Water Quality

If employed wisely, the Forest and Wild Land Tax Amendment can control the premature harvesting of forests and can increase incentive to reforest.

[2] The Commonwealth of Massachusetts Metropolitan Area Planning Council, Stephen F. Ells, Consultant: Open Space and Recreation Program for Metropolitan Boston, Volume 4 Massachusetts Open Space Law (1969) P. 60.

For example, "... The legislature could declare that the presence of properly managed forest lands adjacent to watercourses in the Commonwealth served a public purpose in view of the state's increasing problems of pollution, water supply and flood control. (8) It could further declare that any wild or forest lands, within two hundred feet of any critical watercourse, which the owner agreed not to develop, and on which forestry conservation measures (and such flood, pollution and erosion control measures as did not interfere with forestry conservation) were practiced would henceforth be tax free."[3]

Similar results can be anticipated from use of the other enumerated forms cited above.

Impact on Water Quality

Unknown at this time.

Constraints

The principal constraint inherent in this form of control is the danger of using the technique to limit development for reasons unrelated to the proper management of open space and water resources. There is no guarantee that tax concessions will be granted to land owners which are consistent with overall comprehensive planning goals and objectives.

e. Regulation of Site Location

Summary of Land Use Controls

"In 1970, the State of Maine enacted legislation for regulating site locations of industrial and commercial development affecting the environment. The statute created an Environmental Improvement Commission with authority to control the locations of such developments so that they "will have the minimal adverse impact on the industrial environment". This Commission is also empowered to administer the Coastal Conveyance of Petroleum Statute which establishes the principle that persons in firms discharging oil into the state's waters or land must bear the financial responsibility for cleaning the polluted environment.

[3]Ibid., P. 62

Under the statute (Controlling industrial and commercial location), a person who proposes to construct or operate an industrial or commercial development must notify the Commission of such a development. Such persons are required to meet four criteria which deal with pollution control devices, traffic facilities, the effects of the development on the environment and the suitability of the soil for the proposed undertaking. If the development fails to meet the criteria at the time of the hearing, the Commission may approve the development only on the condition that the applicant will see to it that the criteria are met. In the event that the Commission's orders are not met, the statute instructs the state's Attorney General to enforce them. Appeal to the state's Supreme Judicial Court is provided under the Act."[4]

Relationship to Water Quality

By requiring developers to meet the criteria described above, the State of Maine has taken an important step in insuring that development of this nature will not have a detrimental effect on the various water bodies within the state.

Impact on Water Quality to Date

Unknown at this time.

Constraints

"One major drawback of the statute is that local governments are not allowed to participate in the state's review of developments for effect on the environment. A developer, however, in addition to satisfying the provisions of the statute must also meet local planning and land use requirements.

Another problem is that the Commission's criteria are not related in the Act to the plans and controls of local governments."[5]

[4] Division of Community Services, Mass. Dept. of Community Affairs; A Prospectus on the Need for A State Land Use and Urban Growth for the Commonwealth of Mass., (State Printing Office, May 1972), P. 49-50.

[5] Ibid., P. 50

EXAMPLES OF INNOVATIVE ACTION IN STATE LAND USE MANAGEMENT
(1961-71)

State	Program description	Reference	First Enacted	Administered by
Colorado	Colorado Land Use Act Provides temporary emergency power over land development activities and authorizes model resolutions.	Ch. 106-4, C.R.S. 1963	1971	Colorado Land Use Commission
	Authorizes State to prepare subdivision regulations in counties where no regulations exist.	Ch. 106-2, C.R.S. 1963	1971	Colorado Land Use Commission
Delaware	Coastal Zone Act. State management of shore zone industrial development.	Ch. 70, T.7	1971	State Planning Office
Hawaii*	Land Use Law. State management of land of broad categorical districts.	Ch. 205	1961	State Land Use Commission
Maine*	State management of all lands in unorganized or deorganized townships.	Title 12, s. 681-689	1969	Land Use Regulation Commission
	Approval of large-site industrial or commercial developments, potential polluters, and residential sites over 20 acres.	Ch. 3 s. 481-88	1970	Environmental Improvement Commission
	"Critical Area" program to provide for management of all shoreland areas 250 ft. from high water mark.	Ch. 424, s. 4811-4814	1971	Environmental Improvement Commission

EXAMPLES OF INNOVATIVE ACTION IN STATE LAND USE MANAGEMENT--Cont'd.
(1961-71)

State	Program description	Reference	First Enacted	Administered by
Massachusetts*	"Critical Area" program for protection of coastal and inland wetlands.	Ch.130, s. 27A, 105 and Ch. 131, s. 40,40A	1963	Department of Natural Resources
	Zoning Appeals Act. To ensure dispersion of low-income housing.	Ch. 774 Acts of 1969 s. 1-2	1969	Department of Community Affairs
Michigan	Shorelands Management and Protection Act	Act. No. 245, Public Acts of 1970	1970	Department of Natural Resources
Oregon	Governor shall prepare land use plans and enforce zoning on all areas not subject to local regulation.	S. 10, 1969	1969	Governor
Vermont*	Approval of site development in accordance with state land use plan.	Ch. 151, 6001	1970	Environmental Board
	Shoreline Zoning Act. Zoning to prohibit all construction within 500 ft. of shoreline at all bodies of water larger than 20 acres.	Act 281	1970	Department of Water Resources
Wisconsin*	Shoreline Zoning Law. "Critical Area" program for management of lands around lakes and waterways.	Ch. 614-8588	1965	Department of Natural Resources

SOURCE - Council of State Governments: The State's Role in Land Resource Management.

The following chart summarizes examples of recent state action in the area of land use control. It is intended to be an inclusive documentation of such efforts. Asterisks indicate state programs discussed within this appendix.

f. State Urban Development Corporations

Summary of Land Use Controls[6]

In 1968, the New York State Urban Development Corporation Act created the Urban Development Corporation (U. D. C.) to establish and encourage residential, commercial and industrial development. The U. D. C. has the authority to plan, regulate and develop and, under certain conditions, set aside local codes that interfere with its development plans and objectives.

It was recently reported in a national magazine ("House and Home", July 1973, Vol. 44, No. 1, published by McGraw Hill, Inc.) that the New York U. D. C. has lost its powers to override local zoning. Because all of the facts surrounding this circumstance are not yet known, it was decided to leave this section as originally submitted in draft form. The reader, however, should make substantial allowance for the implications of this change.

In short, the U. D. C. 's major strength is that it combines a variety of powers in a single agency and can put together partnerships among state agencies, local governments, and private firms that would otherwise prove difficult without the authority and powers vested in it.

Presently, New York has the only comprehensive U. D. C. legislation in the country. It recognized that local governments were too large and unwieldy to handle others. A new entity was needed which would have a high degree of mobility and flexibility and, above everything, sufficient power to try to carry out new solutions. Thus, U. D. C. has extensive powers. In addition to planning, regulating, developing, and bypassing local codes, it also has the power to buy, sell, hold and lease property; to appoint staffs; to grant tax exemptions;

[6] Land Use Policy Document No. 1, A Prospectus on the Need for A STATE LAND USE AND URBAN GROWTH POLICY FOR THE COMMONWEALTH OF MASS., prepared for the Governor's Task Force on Land Use Policy, Mass. Dept. of Community Affairs, May 1972.

to create subsidiaries; to conduct and rehabilitate projects, to manage public and private projects; to lend, borrow and receive money. It also has the important advantage of having its bonding activities handled by the state's housing finance agency, whose bonds are easily marketed.

The statute, however, sets a number of safeguards for local governments.

U. D. C. plans must be reviewed by the affected localities.

U. D. C. cannot start a project after local disapproval unless an affirmative vote is cast by two-thirds of the U. D. C. directors.

Where local codes are bypassed, U. D. C. must abide by the state building construction code.

The statute requires that U. D. C. must take into account the concern of all local governments over the loss of tax-revenue when a taxpaying property becomes involved in a U. D. C. development. In order to minimize losses in tax revenues, the statute provides that when U. D. C. purchases a site, the corporation pays to the locality an amount equal to the tax revenue received from the property during the last three years.

The "write-down" power which is available to local planning agencies under Federal legislation for urban renewal projects is not extended to the U. D. C.

In Massachusetts, attempts to introduce similar U. D. C. legislation have not been successful to date. Since 1970, a series of bills have been introduced into the legislature proposing a U. D. C. with powers similar to that of New York's. Current Senate Bill No. 1624 (April 1973) is the latest abridged version. The current proposed act has eliminated the corporation's power to override local controls such as zoning; thus, this Bill as a vehicle for comprehensive land use control is limited.

Relation to Water Quality

By virtual control over all land uses within a given jurisdiction, a U. D. C. has potentially greater regulatory powers over the immediate environment than that of any other land use tool. Residential, commercial, and industrial uses can be directed to those areas for which they are geologically and geographically best suited, mini-

mizing the need for remedial engineering and structural solutions for wastewater management. In short, U. D. C. comprehensive planned policies for water supply, sewerage and solid waste disposal can lead to a reduction of, and better treatment for wastes; this will in turn reduce the impact on the quality of receiving waters and, therefore, the impact on uses of water for recreation, aquatic life, and domestic, irrigation and industrial uses. [7]

Impact on Water Quality to Date

Little, if any, information is available on this aspect of U. D. C. activities.

Constraints

In expanding present development, a major constraint for U. D. C. legislation lies in the inherent difficulties of building on the undersized pipes or outmoded design of existing sewer and water systems, rather than building wholly new systems designed to expand to serve the goals of a future land use plan. In new town development, the process of planning for utilities can be far more comprehensive. Currently, New York has a number of new towns in various stages of planning and development. In addition to the above, the legal powers of acquiring land and providing for local review procedures in existing communities can be time consuming.

For Massachusetts, the ultimate constraint lies in the fact that currently no U. D. C. legislation has been enacted. Beyond that, the proposed legislation is inadequate for the purpose of controlling land use. Characteristic of this inadequacy is the following provision soliciting Home Rule powers which would effectively negate the necessarily broad powers needed for a U. D. C. to control land use.

"... any municipality within which the project is to be located, by majority vote of its local governing board, if any, may recommend approval, disapproval, or modification of the project plan which recommendation shall be submitted in writing to the corporation within thirty days after such hearing; and after due consideration of such testimony

[7] MANAGING WATER QUALITY: Economics, Technology Institutions, Kneese and Bower, John Hopkins Press, 1968, p. 14.

and comments and municipal recommendations, if any, the corporation must modify or withdraw the project plan."[8]

3. Regional

a. Regional Planning Agencies

Summary of Land Use Controls

Regional Planning Agencies have no formal authority to control land use; this resides primarily with local communities as delegated to them by the state. RPA's have, however, a general planning and advisory role which provides a degree of influence.

RPA's must review certain projects under Bureau of the Budget Circular A-95. Most projects involve the construction of physical facilities which may have impacts on land use. The RPA's opinion of the project is based on conformity with regional plans, and its review is advisory to the appropriate Federal categorical grant programs.

Federal agencies notably, HUD, EPA, and DOT have established certification requirements for comprehensive planning, open space, sewer and water and comprehensive transportation planning. Federal assistance funds for facilities under these programs will be advanced only for those projects which conform to the appropriate regional plans.

In addition, RPA's have the opportunity to review local plans, zoning changes, and other matters voluntarily referred to them by member communities for advisory opinions. The reasons for such voluntary referrals vary from the desire to receive benefits in return for the community's per capita assessment to a sincere desire to conform to regional interests. Nonetheless, the fact remains that the RPA's cannot require communities to alter these plans; they can only persuade.

[8] Section (V), Senate Bill No. 1624, p. 29.

Relationship to Water Quality

The most direct relationship in evidence at the regional level is the certification requirement for water and sewer plans (and to a lesser extent, other related plans). This requirement insures that in order to receive Federal funding, municipalities must develop plans consistent with the areawide plan for the region as a whole.

Impact on Water Quality to Date

The impact of these controls cannot be measured with any degree of certainty at this time. However, the certification requirement seems to be considered a successful tool in light of current EPA requirements that all EPA funded projects must consider regional solutions in their planning.

Constraints

The major constraint constantly facing regional planning agencies is their "advisory" status. Until they have clearly expressed authority to control land use at the regional level, they will always be faced with problems of implementation.

Other constraining factors include inadequate funding, inconsistent public support, and an uncertain status in terms of overall statewide water quality management.

b. Regional Development Commissions

Summary of Land Use Controls

Some states have established special commissions with control over land use decisions within geographic boundaries. The Hackensack Development Commission is one such example. The Commission was created in 1971 by the New Jersey Legislature to exercise zoning and taxing powers, and to control the use and development of land in an area of meadows (21,000 acres) located within the boundaries of fourteen separate local governments which are part of a two-county area of over 1.4 million people.

Under the Act, the Commission also empowered to buy land, exercise eminent domain, undertake development projects, and provide solid waste facilities. Also, the Commission has the power to regulate all subdivisions in the district, issue building permits and

serve as the local agency in the district for all urban renewal projects. The law provides that all municipalities within the district must revise their land use and building codes to be consistent with those of the Commission. Provision is also made for the Commission to be represented at all local public hearings dealing with plans, zoning and subdivision.

Moreover, the Commission has also the power to issue bonds, lease land, levy special assessments for covering the cost of improvements, collect fees for the use of facilities operated by the Commission and seek and obtain funds from the Federal government.

Relationship to Water Quality

The exercise of zoning and taxing powers is the chief mechanism used by this Commission which would facilitate the implementation of water quality goals and objectives. Since the Commission is empowered to provide solid waste facilities, it would not be inconceivable for similar bodies to develop wastewater treatment plants and other water quality related facilities.

Impact on Water Quality to Date

Unknown

Constraints

The major constraint apparent for the use of this type of Commission within the Commonwealth is the absence of Enabling Legislation. Chapter 40B seems to come close to providing the existing regional planning agencies with the powers intended to effectively regulate the use of land within the various regions. The strongly engrained concept of Home Rule would very likely act as a major obstacle to any attempt to implement the necessary legislation.

c. Shoreline Development Controls

(See "Wetlands and Shoreline Controls" under the summary of State Controls).

d. Metropolitan Planning Council (Minneapolis St. Paul)

Summary of Land Use Controls

The body has the authority to make mandatory reviews of local (except counties) and special district plans. Moreover, the Council's authority is reinforced by its authorization to make studies and recommendations regarding many issues of importance to local governments and by its power to raise revenue through property taxes. The Council also has the authority to buy, sell and lease property, issue bonds, employ staff, condemn property and accept loans and grants.

In 1969, the Legislature increased the powers of the Council by the enactment of two important legislative measures -- the Metropolitan Sewer Board Act and the Metropolitan Park Board Act. The Sewer Act authorizes the Council to appoint a seven-man board to be responsible for the collection, treatment and disposal of sewage for the entire metropolitan area. The Board's plans and budgets are prepared by the Council. Local governments may not construct their own sewer facilities until the plans have been reviewed and approved by the Council. This authority provides the Council with an important tool to guide development within the metropolitan area.

Relationship to Water Quality

The responsibility for the collection, treatment, and disposal of sewage for the entire metropolitan area and the use of local sewer plans are the principal tools in use by this Council in attempt to achieve water quality goals and objectives.

Impact on Water Quality

Little information is available concerning the successes and failures of this activity to date. However, it seems safe to assume that the very existence of the Enabling Legislation insures an improvement in the overall water quality management process since it creates a comprehensive, coordinated regional effort.

Constraints

The major constraints which would be placed on this type of body if it were to be implemented within the Commonwealth are similar to those mentioned during the discussion of Regional Development Commissions (b). To date, the required Enabling Legislation

does not exist; nor is there any indication that any efforts will be made in the near future to generate such legislation.

e. Metropolitan District Commission

Summary of Land Use Controls

The Metropolitan District Commission (MDC) was formed in 1919 by reason of a state constitutional amendment requiring that all state boards and commissions be organized into not more than twenty departments. The Commission as organized under Chapter 92 of the General Laws encompasses functions of providing sewerage, water and parks systems in the Boston Metropolitan Area.

Relationship to Water Quality

In the field of water resources, the Commission has been charged with the construction, maintenance, and operation of water and sewer systems, sufficient to serve its member communities. The Commission has separate divisions for the operation and maintenance of its separate functions pertaining to water, sewerage and parks. The Construction Division incorporates the function of long-range planning of facilities and resources needed to meet future demands.

The existing systems evolved from long-range planning efforts. Although essentially "single-purpose" in nature, they contain the element of providing for projected future needs.

Impact on Water Quality to Date

The responsibilities of the MDC are obviously numerous and complex. The task of providing an ample supply of water to the Greater Boston area is becoming more and more difficult to accomplish. Nevertheless, there is no doubt that the Commission has carried out its legislative mandate to the best of its ability over the last 54 years.

Constraints

Since all the major cities and towns within the study area currently operate their own water and sewer systems either individually or in some cases jointly, any attempt to establish an area-wide district commission within the Merrimack River would immed-

iately meet with a previously mentioned roadblock created by the traditional concepts of Home Rule. Furthermore, the formation of such a commission would probably require some form of a state enabling legislation. Money would have to be allocated from the State Budget to help fund the accomplishment of the various functions called for under the amendment. Given the current economic guidelines within the Commonwealth, it is very doubtful that this could be accomplished in the near future.

4. Local

a. Local Zoning

Summary of Land Use Control

"The Massachusetts Zoning Enabling Act, Chapter 40A, General Laws"

Chapter 40A of the General Laws authorized zoning "For the purpose of promoting the health, safety, convenience, morals or welfare of its inhabitants, any city, except Boston and any town, may be a zoning ordinance or by-law regulate and restrict the height, number of stories and size of buildings and structures, the size and width of lots, the percentage of lots that may be occupied, the size of yards, courts and other open spaces, the density of population, and the location and use of buildings, structures and land for trade, industry, agriculture, residence or other purposes;. . .!' Section 14 states that "Every zoning ordinance or by-law shall provide for a board of appeals. . ." and authorizes it to deal with variances and special permits.

Also contained in the General Laws are specific and related provisions for conservation and water quality management.[9]

Flood Plain Zoning

Section 2 of Chapter 40A of the General Laws contains the legal basis for permitting communities to enact flood plain zoning. In regulating ". . . . the density of population, and the location and use of buildings, structures and land for trade, industry, agriculture, residence or other purposes. . . ." it specifically states that "A zoning ordinance or by-law may provide that lands deemed subject to seasonal

[9] CONSERVATION COMMISSION HANDBOOK, Pages 37-39 summarized.

or periodic flooding shall not be used for residence or other purposes in such a manner as to endanger the health or safety of the occupants thereof."

At least two landmark cases have upheld the legality of this provision in the Commonwealth, but it has become clear that a municipality must have a well-drafted by-law "...free from vagueness and indefinite boundaries, and containing some permitted uses and some sort of exception or permit procedure." It is also important to note that a flood plain by-law must be enacted through amendment to the existing by-law following the procedures outlined in Section 6 of the General Laws. Flood plain zoning has more direct applicability to water quality planning than any other aspect of zoning.

Conservation Zoning

The right to adopt "conservancy zones" is not well defined in the General Laws. The possibility of establishing such a zone must be inferred from the intent of the wording on flood plain zoning in Section 2. As essentially the same purposes are covered under flood plain zoning, very little conservancy zoning per se has been enacted in Massachusetts.

Large Lot Zoning

In practice, large lot zoning usually means that residential building must occur on lot sizes of two or more acres. In Massachusetts (and elsewhere) the constitutionality of large lot zoning is not being upheld in current court decisions, if it is being used for exclusionary purposes rather than for statutory reasons.

Cluster Zoning and Planned Unit Development (PUD)

Though there are some differences between cluster zoning and planned unit development (PUD) for purposes of water quality management the end result of these provisions are nearly the same. The basic advantage of either arrangement is that for a given parcel of land they permit a more dense building of residential (i.e. smaller lot sizes) or commercial or industrial uses in exchange for an agreement to preserve the remaining land in a natural or open space. Such arrangements usually require municipal water and sewer facilities to serve the relatively denser development. Currently, Massachusetts has no specific enabling legislation authorizing cluster or PUD development, though legislation has recently been proposed. Some states without enabling legislation have established cluster or PUD's by

dubious application of zoning variance or except granting powers. Use of the special permit, however, has been the most common way of authorizing this type of development in Massachusetts.[10]

Relation to Water Quality

Large lot zoning can be used as a tool for enhancing water quality when percolation tests reveal that poor soils cannot support high density on-site septic systems; but flood plain zoning and cluster and planned unit development are the two zoning tools which have the most direct application having the advantage of not requiring the expenditure of public funds for water management facilities.

Chiefly, flood plain zoning helps by preserving land in its natural riparian state. While nature provides for flood plain maintenance through vegetative cover and marshlands for water retention, removal of protective cover and the filling of such lands increases runoff, overburdens the capacity of the stream channel, and eventually increases the likelihood of flood hazard requiring structural solutions.

By preserving land in a natural state, the following goals are served for water quality management; these are:[11]

"To provide that lands ... subject to seasonal or periodic flooding ... shall not be used for residence of other purposes in such a manner as to endanger the health or safety of the occupants thereof, or the public generally, or as to burden the public with costs resulting from unwise individual choices of land use.

To protect, preserve, and maintain the water table and water recharge areas within the municipality so as to preserve present and potential water supplies for the public and safety.

To assure the continuation of the natural flow pattern of the water course(s) within the municipality in order to provide adequate and safe flood water storage capacity to protect persons and property against the hazards of flood inundation."

[10] 1972 REPORT ON ZONING IN MASSACHUSETTS, HOUSE BILL 5009 (House Bill number has been superceded) An Act to Modernize the Zoning Enabling Statute, December 1971, p. 53

[11] (Section 13.06) FLOOD PLAIN OR FLOOD PLAIN DISTRICT/WETLANDS PROTECTION ZONING BY-LAW ORDINANCE: Massachusetts Conservation Commission Handbook. p. 63

Cluster zoning has the dual advantage of preserving land in a natural state while requiring far fewer roads and utilities including storm damage provisions, for a given density of development. Less non-point source pollution runoff is a direct benefit.

Impact on Water Quality to Date

It is fair to state that those communities which have enacted and enforced flood plain zoning ordinances have helped minimize the possibility of adding pollution from such non-point sources as siltation, agricultural runoff, domestic and solid waste leaching, and the like.

Constraints

The current lack of PUD enabling legislation and the subsequent reliance on the use of the special permit for its authorization makes use of this tool more difficult than need be. An additional problem lies in the fact that both tools are subject to the misuse of variance and special permit granting powers by the local Board of Appeals.

A recent report relative to proposed changes and additions to the Zoning Enabling Act (originally submitted as House Bill 5009 of 1971), outlines and makes recommendations to correct these legislative weaknesses. One problem relates to variances which may only be granted under special conditions.

A further report based on House Bill 5009 of 1971 states that there is ... "widespread improper exercise of variance granting power by local Boards of Appeals in Massachusetts," and that often some Boards of Appeals will ... "condition the grant of a variance on the continued ownership of property by a particular person" ... instead of requiring that any hardship ... "be unique to the land or building and not merely to an individual."[12]

A frequent result of the above practice is that the zoning ordinance and master plan (if in existence) is undermined by the misuse of these variances granting powers. The same constraints apply

[12] The Commonwealth of Massachusetts REPORT OF THE DEPT. OF COMMUNITY AFFAIRS RELATIVE TO PROPOSED CHANGES AND ADDITIONS TO THE ZONING ENABLING ACT (Under Section 3 of Chapter 23B of the General Laws), prepared by Mass. Dept. of Community Affairs for submission to Governor Francis W. Sargent and the General Court, March 14, 1973. p. 14.

to flood plain and other aspects of conservancy zoning. If the Board of Appeals is asked to pass on a variety of potential variance granting matters outside of its purview, something is fundamentally wrong with the local zoning legislation. In such cases, the matter should be handled through legislative action, i.e. zoning revision, not through the misuse of powers.

The use of zoning as a conservation tool has another inherent weakness. Unlike other ways of acquiring control over land, as for example, acquisition or restrictions, an existing zoning by-law can be changed at any time by a two-thirds vote at town meeting, or city council,[13] provided that all provisions for such changes, (e.g.: adequate notice), as spelled out in 40A of the General Laws have been followed.

b. The Massachusetts Subdivision Control Laws, Chapter 41, General Laws

Summary of Land Use Controls

As stated in the General Laws ... "The subdivision control law has been enacted for the purpose of protecting the safety, convenience and welfare of the inhabitants of the cities and towns in which it is, or may hereafter be, put in effect by regulating the laying out of construction of ways in subdivisions providing access to the several lots therein, but which have not become public ways, and ensuring sanitary conditions in subdivisions and in proper cases, parks and open areas. The powers of a planning board and of a board of appeal under the subdivision control law shall be exercised with due regard for the provision of adequate access to all of the lots in a subdivision by ways that will be safe and convenient for travel; for lessening congestion in such ways and in the adjacent public ways; for reducing danger to life and limb in the operation of motor vehicles; for securing adequate provision for water, sewerage, drainage, underground utility services, fire, police, and other similar municipal equipment, and street lighting and other requirements where necessary in a subdivision; and for coordinating the ways in a subdivision with each other and with the public ways in the city or town in which it is located and with the ways in neighboring subdivisions."

[13] See the MASSACHUSETTS CONSERVATION COMMISSION HANDBOOK, p. 39.

Relationship to Water Quality

Principally, the ways in which subdivision legislation relates to water quality management is through requirements for adequate provision for open space, utilities, drainage, thus maximizing the potential for "ecologically sound and sightly developments."[14] More specifically, cluster zoning provisions for the layout of a subdivision with high density areas in exchange for "green space" has the benefit of keeping the land in a more natural state by requiring less roads and utilities which cause runoff. Similar benefits derive from the right to require the reservation of land for potential park areas for three years. But, " ... adequate provision for water, sewerage, and drainage" ... provisions for burying of utilities, and regulation of the drainage of wetlands under the "Wetlands Protection Act" (See Section 12.05, p. 50 of Massachusetts Conservation Handbook for full explanation.) have equal or more immediate consequences for water quality planning ..." piping, filling, and bonding to correct drainage problems" ... as recommended by the Board of Health [15] can also greatly improve water quality.

Impact on Water Quality to Date

Little evidence on the effectiveness of subdivision regulations on water quality has been compiled. However, it seems generally accepted from empirical evidence on an individual community basis that if a municipality follows the provisions of Chapter 41 of the General Laws requiring adequate site plan review and control procedures, including the provision for review by the Board of Health, the chances that the new development will interfere with water quality are minimized.

Constraints

Broadly speaking, the failure of the planning board to follow and enforce the subdivision control review procedure to insure compliance with all provisions of the law has important consequences for water quality. (The same is often true of the responsibilities of the local Board of Health and other municipal boards). Frequently, this is due to the fact that members are not qualified to make technical

[14] MASSACHUSETTS CONSERVATION COMMISSION HANDBOOK, p. 11.

[15] MASSACHUSETTS CONSERVATION COMMISSION HANDBOOK, p. 40.

decisions on the adequacy of provisions for water, sewerage, and drainage facilities. Ultimately, this constraint lies in the legislation in that no special architectural, engineering or similar technical expertise is currently required to be elected or appointed to office.

c. Public Acquisition

Summary of Land Use Controls

There are three basic methods of obtaining land by public acquisition: by gift, by purchase or by taking by eminent domain. (The Massachusetts Conservation Handbook should be consulted for a full explanation of this section). Most states have the same regulations. In Massachusetts, municipal government, or an officially enacted Conservation Commission maintains administrative control over the land with deeds of either fee or lesser interest in the name of the municipality. When acquisition is by gift, it is necessary to search the title and obtain informal approval from the selectmen. The Commission then may vote to accept the land in the name of the municipality for conservation purposes.

The Planning Board and abutters should also be consulted. A charitable gift trust, if the donor desires, may also be established to maintain land in its natural state.

If land is acquired by purchase, a commission which has enough cash may purchase a parcel of land without town meeting or selectmen approval. In such cases, the commission merely adopts a vote authorizing the purchase, has a deed prepared and executes it. Any purchases made out of state or by Federal funds must be approved by the municipality before purchase.

Eminent domain takings are more stringent in that a taking must be by two-thirds vote of town or city council meeting and be executed by the selectmen or aldermen.

The Massachusetts Self-Help Act provides matching funds for purchasing lands which are preserved or nearly preserved in their natural state.

Relationship to Water Quality

Public acquisition combines the effects and benefits of other types of municipal land use controls. By acquisition, a variety of land forms may be maintained, improved or otherwise protected

thus insuring the conservation and proper utilization of open spaces in land and water areas. Since virtually any land may be acquired, the effects of acquisition on water quality can have the same results as those of many other types of municipal controls such as flood plain zoning, subdivision control, easements, taxation, etc. This insures the general benefits of protection to marshlands and recharge areas, potable water supplies, flood plains and general watershed protection, and minimizes the negative effects from density and inappropriate urban development. Public acquisition is also more permanent than flood plain zoning which can be changed by a two-thirds vote at town meeting.

Impact on Water Quality to Date

The effects of public acquisition on water quality management is not fully understood except in specific cases. Public water supply protection and the establishment of conservation districts are perhaps the two uses receiving the greatest public fiscal support. For most laymen, the connection between public water supply protection and expenditure of public funds is obvious, whereas the important relationship between water quality and acquisition of flood plain aquifers and other critical areas is usually not well understood.

Constraints

The most important constraints in acquiring and maintaining land for public acquisition among Massachusetts cities and towns are the following: (1) lack of a formal conservation commission for purchasing and controlling land; (2) the lack of the "know how" to take advantage of the legislative and legal methods associated with acquisition; (3) lack of funds and knowledge of funding sources such as the Self-Help Program; and (4) lack of familiarity with other organizations, such as the Massachusetts Audubon Society and Massachusetts Trustees of Reservation and their services for natural areas acquisition and control. Probably the communities most successful at acquiring and maintaining land have been those which have established conservation commissions (over 300 of 351 cities and towns by mid-1972) under Section 8C of Chapter 40 of the General Laws. However, though there have been many successes, some communities "... have experienced difficulties in developing viable programs and local support ..."[16]

[16] MASSACHUSETTS CONSERVATION COMMISSION HANDBOOK 1973, Mass. Association of Conservation Commissions, Boston, p. 3.

d. Easements (Restrictions)

Summary of Land Use Control

An easement, now generally referred to in Massachusetts as a "restriction", is basically a written agreement between a private owner of real property and a public or private organization to prohibit or limit the development of private property in a certain agreed upon way as permitted in Section 12.01 of the Conservation Act, Chapter 40, General Laws. The Conservation Act authorized commissions to acquire restrictions for such purposes as land or water rights, or conservation, or simply to ensure that a particular view will be preserved. Important advantages of restrictions over fee (Owner) interests are usually less cost to the community, it is still available for limited uses such as farming, recreation, and the like. If no time duration is agreed upon, a restriction is enforceable in perpetuity unless voided by a taking by eminent domain. Any restriction necessitating a capital expenditure must be approved by a two-thirds vote of a city council or town meeting and must be approved by DNR.

Relationship to Water Quality

Restrictions are a least cost alternative to public acquisition and in many cases may be easier to obtain than a change in zoning. However, whichever of the three methods is used to acquire rights to land, restriction, acquisition or zoning, (apart from State legislative action), the results for water quality are nearly the same, as they all relate to the interdependency of land and water resources. Acquiring restrictions for land development, for example, instead of creating flood plain zoning, can also help reduce runoff from sediment loads, fertilizer, pesticides, waste disposal areas, etc.[17] Similarly, acquiring restrictions over marshlands can help preserve natural water retention areas maintain natural streamflow characteristics, as will woodland preservation in watersheds prone to excessive runoff.[18]

[17] See A FRAMEWORK PLAN - SOIL CONSERVATION FOR A BETTER AMERICA, U.S. Dept. of Agriculture, Soil Conservation Service, 1971. (Ideas were taken from section on Environmental Quality Control, p. 11).

[18] See example of flood plain by-law ordinance, MASSACHUSETTS CONSERVATION COMMISSION HANDBOOK, p. 63.

Impact on Water Quality to Date

As is the case with zoning, the degree of success of controlling land through restrictions for purposes of water quality management is not well documented. But documentation not withstanding, there is little reason why this technique should not succeed if it were more widely understood and utilized.

Constraints

Probably the most important constraint for the use of this technique is simply that many municipalities do not fully understand and utilize it. Restrictions should be used with other techniques as an integral tool for achieving the goals of an open space conservation plan.

e. Housing and Sanitary Codes

Summary of Land Use Controls

The Commonwealth, as most states, has a number of sanitary regulations relevant to water and land use. In Massachusetts, these are: Chapter 111, Section 5 of the General Laws as amended by Chapter 522 of the Acts of 1960 and as further amended by Chapter 898 of 1966 and April 8, 1969 in accordance with the provision of Section 127A of Chapter 111.

The State Sanitary Code, Article I, General Application and Administration, and Article II, "Minimum Standards of Fitness of Human Habitation." Since the state presently has no housing code, the State Sanitary Code functions in this capacity. Generally, it has been enacted to serve the following purposes.

---"To establish minimum standards of health and safety for dwelling units.

---"To protect individual households, neighborhoods and the community from unsanitary conditions.

---"To maintain property values."[19] (*NOTE: This item in particular may be a useful by-product, but it is not a central concern of the State Sanitary Code).

[19] HANDBOOK FOR ADMINISTRATION OF HOUSING CODE PROGRAMS, Edited by C. J. Dinezio and P. E. Stanton, Office of Code Development, Dept. of Community Affairs, Commonwealth of Mass., p. 21.

---"To improve physical and environmental housing conditions."[20]

The code is administered and enforced by local governing bodies under the provision of Section 127B of Chapter 111.

Article XI of this State Sanitary Code, authorized by 127A, of Chapter 111 of General Laws, entitled "Minimum Requirements for the Disposal of Sanitary Sewage in Unsewered Areas" deals with the design construction, and maintenance of septic systems and specifies setback and site requirements for individual and contiguous lot development. The local Board of Health administers and enforces this Article of the State Sanitary Code.

Chapter 142 of the General Laws as amended by Chapter 358 of the Acts of 1965, and Chapter 604 of the Acts of 1971 established a "Uniform State Plumbing Code" which is administered by local officials, and, as stated in Sub-section 2:1 ... " is founded upon certain principles of environmental sanitation and safety through properly designed, acceptably installed, and adequately maintained plumbing systems."[21]

Section 150A of Chapter 111 of the General Laws as amended, and as inserted by Chapter 839 of the Acts of 1970, establishes "Regulations for the Disposal of Solid Wastes by Sanitary Landfill." The local Board of Health (or authorized agent) is charged with administering these regulations referring specifically to sanitary landfill operations. The purpose of the regulations, as stated in their preamble, is to " ... prevent the occurrence of conditions of air, land and water pollution and to assist in the abatement of such conditions when and where such pollution may occur. It is the intention of these regulations that wetlands or areas subject to flooding shall not be used for sanitary landfill sites."

"Section 160 of Chapter 111 of the General Laws, and every other act thereto enabling and in accordance with the provisions of Chapter 30A of the General Laws ... " establishes ... "Rules and Regulations for the Purpose of Preventing the Pollution of Certain Waters Used as Sources of Public Water Supply." Basically, these

[20] Ibid

[21] MASSACHUSETTS STATE PLUMBING CODE, p. 4.

rules and regulations, administered by the State Department of Public Health, specify a wide range of polluting influences that shall not ... "be located, constructed, or maintain within fifty feet of high water mark of such sources of water supply or tributary thereto." Among the many possible sources of pollution specified, are varied activities related to human and animal wastes, cemeteries, sewer systems for conveyance of either domestic or manufacturing wastes, hospitals for the treatment of contagious or infectious disease, and wading or bathing activities. The law further specifies that some activities will not even be allowed in the watershed of a source of water supply or tributary to it, until the location has been approved in writing by the Department of Public Health, and all other provisions and orders of the Department have been complied with.

Regarding Public Health, Chapter 111, Section 17 states that "Disposal of sewage; consultation, advice or experiments; hearing; improvements; definition. The department shall consult with and advise the officers of towns and persons having or about to have systems of water supply, drainage or sewerage as to the most appropriate source of water supply and the best method of assuring its purity, or as to the best method of disposing of their drainage or sewage with reference to the existing and future needs of other towns or persons which may be affected thereby. It shall also consult with advise persons engaged or intending to engage in any manufacturing or other business whose drainage or sewage may tend to pollute any inland water as to the best method of preventing such pollution, and it may conduct experiments to determine the best methods of the purification or disposal of drainage or sewage. No person shall be required to bear the expense of such consultation, advice or experiments. Towns and persons shall submit to said department for its advice and approval, their proposed system of water supply or of the disposal of drainage or sewage, and no such system shall be established without such approval. All petitions to the general court for authority to introduce a system of water supply, drainage or sewerage shall be accompanied by a copy of the recommendation, advice and approval of said department thereon. The department may, after a public hearing, require a city or town or water company to make such improvements relative to any existing treatment works as in its judgment may be necessary for the protection of the public health. In this section, the term "drainage" means rainfall, surface and subsoil water only, and "sewage" means domestic and manufacturing filth and refuse. As amended St. 1937, c. 340."

Relationship to Water Quality

The State Sanitary Code presently fulfills the following functions: (because it is being used as a housing code in Massachusetts, the relationship of each type of code (qua code) to water quality will be discussed independently): Housing Codes among other methods, achieve their purpose through setting: (1) Standards for water supply and structural conditions; (2) Ordinances which establish specifications for new construction, as well as for standards and basic administration and enforcement for existing limits; and (3) through the establishment of an inspection system, both state and local for assuring legal compliance.[22]

The State Sanitary Code is related specifically through its outlined procedures for systematic inspection by the local Board of Health of, among other things, bathroom facilities, water supply, and solid waste storage and disposal.[23]

In relation to water quality, among the important principles of the Plumbing Code are the following, which must comply with all Articles of the State Sanitary Code.[24]

Sub-section 2.2 Principle No. 1 - all occupied premises must have potable water ... " which shall not be connected with unsafe water sources, nor shall it be subject to the hazards of backflow or backsiphonage.

Sub-section 2.17 Principle No. 16 - individual Sewage Disposal Systems. "If water closets or other plumbing fixtures are installed in buildings where there is no sewer within a reasonable distance, suitable provision shall be made for disposing of the sewage by some accepted method of sewage treatment and disposal."

Sub-section 2.22 Principle No. 21 - Protect Ground and Surface Water. "Sewage or other waste must not be discharged into surface or sub-surface water unless it has first been subjected to some acceptable form of treatment."

[22] HANDBOOK FOR ADMINISTRATION OF HOUSING CODE PROGRAMS Pages 21-23.

[23] HANDBOOK FOR ADMINISTRATION OF HOUSING CODE PROGRAM, Pages 22-23.

[24] Sub-section 2.2, Page 4; Sub-section 2.17, Page 8; Sub-section 2.22, Page 9.

Requirements for the Disposal of Sanitary Sewage, the regulations for Sanitary Landfill Operations and the requirements for protecting the public water supply are more directly applicable to water quality planning.

Provision for effective regulations and inspections for sanitary sewage will help prevent pollution from runoff and pollution of groundwater recharge areas from overburdened or poorly designed or utilized septic systems.

Regulations for effective sanitary landfill operations will also prevent surface and groundwater pollution by restricting the use of wetlands and flood plains for landfill operations.

Because geological characteristics are important for site selection, it is necessary to:[25]

"determine the availability, quality, and quantity of on-site soil for cover material; and

evaluate the influence that geological factors, such as ledge, would have on the ease of excavation and potential for groundwater and surface water pollution; and

determine the maximum and normal groundwater table elevation, and groundwater flow patterns; and

determine probable patterns of underground travel of methane gas, and its attendant restrictions on nearby land use; and

evaluate public importance of groundwater supply to be affected by the operation."

The regulation of activity on lands adjacent to, or within the watershed of a public water supply are designed to prevent harmful runoff and leaching from a wide variety of human and animal activities, both domestic and industrial.

[25] The Commonwealth of Massachusetts Dept. of Public Health REGULATIONS FOR THE DISPOSAL OF SOLID WASTE BY SANITARY LANDFILL adopted under the provision of Section 150A, Chapter 111, G. L., p. 3.

Lastly, the relation of water quality to the regulations for consultation and advice to communities for the disposal of sewage are self-evident.

Impact on Water Quality to Date

Though individual cases have proven the necessity for such controls, information relative to their effectiveness has not been quantified. Nevertheless, it is safe to assume that the absence of such controls would have dramatically negative consequences for ambient water and underground recharge areas, especially in those communities characterized by high density development and poor soils.

Constraints

Lack of enforcement of local building, sanitary and health codes at the local level are by far the most important constraints. This may be the result of such specific causes as lack of trained personnel, or an effective inspection program, or an adequate budget. OR, it may ultimately be due to the fact that local government is not sufficiently well organized or knowledgeable to deal with problems associated with land use, development and the environment.

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